FORMER NEBRASKA ORDNANCE PLANT

RESTORATION ADVISORY BOARD MEETING

HELD IN ASHLAND, NEBRASKA

DATE: APRIL 24, 2007

TIME: 7:00 P.M.

Reported by: Susan McKenzie
Videographer: John Thomas

Whereupon, the following proceedings were had, to-wit:)

GARTH ANDERSON: On our agenda tonight, we'll review the agenda, go over the activities since the last RAB. We'll talk about he groundwater monitoring as normal. And we'll give you updates for our groundwater model since we've done some significant updates to that. By request, we've had a lot of discussions on site risk. So we're going to have extensive discussions on that tonight.

Some introductions. First our Community Co-Chair, Melissa Konecky, in the back. I'm the Army Co-Chair. And we have a few Restoration Advisory Board Members, Scott Marquess from EPA right here. We have John Myoshi and Larry Angle from Lower Platte. We have Bruce Haley from the university?

Let's see. Did I miss anybody? The RAB members are here. I think we have everybody.

As usual, our meetings are being recorded both on video, and our actual court reporter will be here momentarily and she'll pick up the beginning of the transcript off the video. And when you do stand up to speak, please state your name clearly so we can get it on the video. And just let's try to get one question at a time so we can answer the question fully before moving on to the next one.

Project mailing list, if you'd like to be on that, please put it on the sign-in sheet out front. We have a project website with project information. And for those of you that like e-mail, if you'll put your e-mail address on the sign-in sheet, I send out periodic updates of the materials and other notices via e-mail.

Okay. What we've done since the last RAB meeting which was in January, first, and I think it's one of the more important things that's gone on, we did the baseline sampling for expanded monitoring well network, those are -- Mary, if you could point to this again for those that may not

have been at previous presentations, the line runs southeast that we've sampled --

MARY LYLE: starting over here by Load Line one and running along the eastern side, and to the south.

GARTH ANDERSON: Okay. We've talked a lot about the new expanded monitoring well network.

And I just wanted to point out that we did do the baseline sampling in January, the results of which will be reported next month and we'll discuss them at the July RAB meeting.

QUESTION?

MS. MOORER: This is Lynn Moorer.

Thank you for the visuals. But again, we respectfully request that whenever one of you points to something on the map, please take care to also give some sort of verbal explanation where you are so that when we read it in the transcript, it has a little bit more meaning. So like for example, Ms. Lyle just referred to monitoring wells, 79, 80, 89 and 90 that are on the south part of Load Line 1 and monitoring wells 6, 8, 10, 11, 12 down on the southeastern portion of Load Line 4; is that correct?

GARTH ANDERSON: No –

MS. MOORER: Then make it correct. Refer to numbers and locations so the transcript makes more sense.

GARTH ANDERSON: What we sampled were seventy new wells along the southern perimeter of the plume and along the eastern edge of the plume. So there have been seventy new monitoring wells that we installed last fall as part of our expanded monitoring well network.

The Post-It notes that you see here will be referred to later in the meeting, the surface water sampling points. We found that it shows up a lot better on the video if we put Post-It notes up there.

In March we sampled, did our quarterly sampling. We just got finished with that. We'll obviously be reporting that, the results of that, at the July RAB meeting.

We continue to do our one-year evaluation for the new Load Line 1 Extractions Wells 12 and 13. In fact, it's almost exactly a year this month since it went into operation. The results of that will be reported in the Annual Performance Report which will be submitted for the regulators to review in July.

What are some of the documents that we've submitted since the last RAB? We submitted to the regulators the construction work plans for the Advanced Oxidation Process. That's a pretreatment system that would go -- that's part of Extraction Well No. 11. That I will point to here and Extraction Well 11 is in the Load Line 1 plume, about half way down. And then obviously the Advanced Oxidation Pretreatment System will be nearby to that.

We also submitted the updated 2006 groundwater model that we'll be discussing tonight, and of course the December 2006 sampling results that we'll also be talking about tonight.

What’s going to be going on in the near future, quarterly sampling will be done in June.

Now, I would like to add that in the June sampling we will be adding monitoring wells in the vicinity of the old landfill to test the presence of any mustard agent indicators. We are still settling on what chemicals we will be sampling for. And that sampling will commence in June.

Right now we're actually doing extraction well maintenance. Our crews are out there doing some rehab of some of the extraction wells to make sure that they run optimally.

In May we'll actually begin construction of the Advanced Oxidation Process. I mentioned earlier we'll start breaking ground on that. And in May we'll also be starting an intensive direct push investigation of Load Lines of 2, 3, and the more of the Atlas Missile Area -- and I'm going to throw something up here real quick.

This is probably a little hard to see, but we also have bigger maps in the back that shows where these points are that we're going to sample direct push. It will probably be more illuminating if I just point to the big map. We'll be doing some lines of, direct push (a groundwater probe), across Load Lines 2 and 3, and we'll also be going up into the Atlas Missile Area.

Please don't be alarmed. This looks like a fireplace poker, and it is. But it's the only thing I could find as a physical pointer. So I'm not about to charge the audience or anything.

The Atlas Missile Area is up here. We'll be doing some direct push sampling up here to get a better picture of what the source area or areas of high concentration might be up here.

And the idea behind this is to get a more clear picture of what the interior plumes look like so that when we do some new groundwater modeling with our updated model, we'll have a very good picture of what the distribution of contamination is. And it makes for a more accurate, a more -- a better model run so that we know exactly (not exactly) but have a clearer idea of how plumes behave.

Some more planned activities, we talked several times about the five-year review. And that process continues. The draft will be submitted to EPA in July.

The Operable Unit 3 Antimony Soils Removal Action Memo is being drafted now. And once we get the Action Memo which is the document that states – officially is a decision document sort of like a Record of Decision. It says we're going to do this and proceed forward and gives us authority to do that.

The Ordnance and Explosives Recurring Review continues. We have a number of activities related to that. We have site visits and some other activities along those lines.

We continue to update a Community Relations Plan.

MELISSA KONECKY: Garth, I had a question on that.

I'm Melissa Konecky. And I was just going to say, instead of spending, you know, too much money doing a really intricate, you know, Community Relations type thing, you know, maybe that money would be better spent extending that buffer zone. I know that there's dozens of people that have wanted their domestic water supply wells tested that haven't had them tested. And, I mean, as far as your Community Relations Plan, I mean, technically that could be something really simple, right?

GARTH ANDERSON: Oh, a Community Relations Plan is not an extensive -- it's not a big thick document. It's more just something to help guide us a little bit to make sure we're giving the community what they need as far as information sharing and other venues so that all community members have an opportunity to know what's going on at the site.

MS. KONECKY: Well, I mean, you've been keeping us kind of informed about what's going on at the site, pretty much. But you only have so much to money to spend on this whole thing, right? And I know that a lot of the people really would like their domestic water supply well tested.

GARTH ANDERSON: The Community Relations Plan is also a requirement under CERCLA.

So it's something we have to -- but we have one out there that's so outdated, it does require a revision.

LYNN MOORER: Mr. Anderson, this Lynn Moorer again.

May I suggest a very simple solution?

Your Community Relations Plan could be one or two sentences; that is, the plan is to provide all information requested by the public and the RAB at RAB meetings and other public meetings, period, and devote the rest of the resources that you would otherwise spend on your PR efforts and expand the so-called one-mile buffer zone to two miles and include a whole lot more of the domestic wells for testing as the community has repeatedly requested.

Simple as that. So you've got a very simple, straightforward plan which is also concurrent with what the community has repeatedly asked you to do.

On top of that you've got resources -- at least some resources freed up to do much more testing which the community has requested also repeatedly.

GARTH ANDERSON: Well, I don't necessarily agree that the RAB is the only venue you that we should be doing with communities, such as -- on June 21st we're going to have our annual site tour that we thought was a very good event last year, very well received, to give people an opportunity to go out and look at the treatment plant to get a perspective of the site and see things for themselves, you know, what's going on out there, something that is really difficult to do in an auditorium setting.

MELISSA KONECKY: Excuse me, Mr. Anderson. I'm Melissa Konecky.

I agree with you about the site tour. Unfortunately that's kind of a bad night. And, I mean, I don't know would there be a different day --

GARTH ANDERSON: We're open to whatever day works best. It's a proposed date for the site tour. If you'd like to get back to me on what you think would be a better date for the site tour, that's fine. We haven't contracted for any buses or anything yet. Our folks are always available.

MELISSA KONECKY: So you're saying this was just a proposed date?

GARTH ANDERSON: Yes. Now, keep in mind, this does not replace a RAB meeting, its not a RAB meeting, but it's a supplement to other things that we do on the site.

LYNN MOORER: Mr. Anderson, may I just remind you that RAB guidance requires you as Army Co-Chair to confer with the Community Co-Chair with respect to RAB activities and the scheduling. It would be a lot better in general, as we requested previously, to make sure that you check with Ms. Konecky before you even put out preliminary dates like that. I don't think anybody disagrees that the site tour isn't a good idea -- or that it is a good idea. There's no disagreement on that. But it is very confusing when you publish a date like this, it gets reported, and people go home thinking, all right, the site tour is going to be on June 21st. And we can tell you right now, that's not a good date. That's not going to work. So would you please do as has been requested of you repeatedly in the past, don't announce dates for RAB related activities until you check with Ms. Konecky?

GARTH ANDERSON: Will do. All right. Let's move on. At this time I'd like to have Mary Lyle come up and talk about our groundwater monitoring program, a standard part of our RAB agenda.

Mary, it's all yours.

MARY LYLE: As we have in the past, we posted the latest December 2006 data summary report on the website. You also had CDs that you picked up when you came in. And I think we left a few hard copy reports of that sampling event. And as I go through, I'll show some of the latest trends and some of the surface water and monitoring well data that we have, the December data, included on those trend maps.

As Garth mentioned in the beginning, we sampled 70 new monitoring wells that we installed last year. We call that the baseline sampling. And that was done in January. And we're right now doing the validation, and we'll have that posted on our website next month, I guess -- yeah, May of 2007. So that will be available for you all to see, and we'll have more details on that at the next RAB meeting.

And as we -- Garth also mentioned we just recently finished up the March sampling events. We had quite at lot of monitoring wells. We sampled the baseline monitoring well again and also other site wells that we sample on a regular basis, 35 water supply wells and 14 surface water locations. And as typical, we'll have those out within about 90 days from the sampling that the date sampling event ended. So we'll have that out in June and have that available to discuss during the next RAB meeting in July.

And I'll go ahead and start through the trend graphs here. And these are the Post-It notes that I've put on the big map. I'll have Garth point those out. But we'll start with surface water location 6. And when we sampled in December -- that's this last bar over here -- we got results of .959 for RDX. And surface water 6, that's the northern most surface water location we've pointed out on this map. And surface water 6 TCE concentrations, since we started sampling in '04 through December of '06, we've had a range from non-detect to December it was around 3.1.

Going down to surface water 8, which is kind of in the middle of the atlas missile plume down there where Garth's pointing, this is the trend we've seen for RDX in surface water 8. This result from September was around 6, and when we went back in December, the result we got was 2.4 for RDX. And TCE has been the one that's been about the highest in surface water 8 at this site with 56 back in November of 2005, and the latest result we got in December was right around 27 micrograms per liter for surface water 8.

The next trend we have, surface water 10, which is down a little bit downgradient from surface water 8. And those trends have been from around .5 to 2.24, which is what we saw back in December of 2006. That was RDX.

Here's TCE in surface water 10. We had the result of 15.5 in December of '06. And it's kind of ranged you can see from 5 to about 24 over the course of the last two years.

And then surface water 11, we had initial sampling in December of '04 where there was a result for TCE of 12, but we haven't been able -- we've had non-detect results ever since than for surface water 11.

And surface water 12 for TCE has been ranging from about .1 to 1.77, which is what we saw -- I guess this is -- I'm not sure. I need to check on this. This is June of '06. I'm not sure if we have the latest December data on that or not.

We'll have to check back on that and clarify that.

I'm sorry. And if you're following along, the graphs that were posted and e-mailed out and posted on the website, we didn't have surface water 12. We had a duplicate of surface water 8. So the handouts tonight have the correct graph of surface water 12. Sorry I didn’t point that out sooner.

Now, we're going to go over to Load Line 1 and point out a few trends in wells.

This one is for TCE in monitoring well 79. And this is south down gradient of EW12. So what we're seeing here looks like a nice little trend -- since we started up the plant, the Load Line 1 plant, back in earlier '06, we've seen the concentrations reducing down, which is good news because it shows that the EW12 may have some impact on this well. And we're seeing it kind of pull back some of that contamination in that area. And monitoring well 80 is also down gradient of EW12. And we're also seeing -- it's not as clear of a trend, but we've started -- right after Load Line 1 started we saw TCE right around 18, and then in December we're down to about 8 of TCE in monitoring well 80.

The next trend graph that we have is monitoring well 89. This one is actually up gradient of EW12. So this is going to give us an idea of what concentrations are coming into the extraction well.

And in December we were right around one microgram per liter of TCE in that well.

And then the final graph that we have is monitoring well 90. And this is almost due north of EW12, but it's really kind of -- another thing that shows -- it's a good thing we've got the Load Line 1 plant running because we've got higher concentrations coming down, which is what we were expecting, to be moving down that area of the site, so we're able to capture with EW12 some of these high concentrations of TCE. It was 101 in December of 2006 in the shallow well.

And that was all the graphs that I had. Are there any questions specifically? If -- you know, we've got other maps along the site to that show what we were sampling in March and December.

LYNN MOORER: Lynn Moorer.

What amount of contaminants is going into the creeks?

GARTH ANDERSON: Could you be more specific? I'm just trying to make sure I understand your question.

LYNN MOORER: Choose any one of the creeks. For example, could you tell us what amount of contaminant is going into Johnson Creek?

GARTH ANDERSON: Well, I mean, are you talking -- concentration, are you talking about mass of contamination entering the creek?

LYNN MOORER: Both. Mass would be useful for -- you could talk about first.

GARTH ANDERSON: Well, I obviously don't have that off the top of my head. It's not a calculation that we've done. It's something we could make a guess on. But the fluctuations in the concentrations are very -- vary quite a bit for various reasons. But it's a calculation we haven't done to date. And I don't know if there's an easy way to do that. I have to defer to my groundwater modeler who's going to talk a little bit about the improved interface we have between the surface water and groundwater.

So I know I didn't answer your question, and that's obviously something that we'll have to do some homework on.

LYNN MOORER: Can you talk about levels? If you can't talk about mass, can you talk about levels?

GARTH ANDERSON: Well, you see the levels that are going into the creek by our surface water monitoring results that we've already reported.

And one of the maps that we talked about -- let's see. Which -- directly behind us -- and during a break, if you would like to see that. We have a map that we've produced that shows the concentrations within

the plume at 1 -- Load Lines 1 and 4, which gives you a better idea of how the contamination is distributed within the plume. So you can look at that and get a general idea of where some of the more concentrated areas intersect with Johnson Creek.

LYNN MOORER: Take, for example, surface water location 6. In the trend chart that you showed us this evening, slide, I believe it's 16.

GARTH ANDERSON: Yeah, it's up.

LYNN MOORER: For TCE, in December 2006 you had a reading of 3.19? Is that what that says?

GARTH ANDERSON: Yes.

LYNN MOORER: All right. That's clearly above the -- that's rising. At least within the recent past it appears to be rising.

GARTH ANDERSON: Well, I wouldn't call that much of a trend. The scale kind of exaggerates the trend quite a lot. And it's still well below any risk that somebody would have by exposure to anything in the creek.

LYNN MOORER: What is the surface water risk level that's been settled upon by all the parties then?

GARTH ANDERSON: It has not been settled yet. What we briefed at two RABs ago I think, we still have a range of values. And I'll have to look back at what we briefed before about what those levels are. It's still well below even the conservative values we reported in the past. I think the most conservative values were 14 or 15, and ranging on up there with -- that's -- the 15 is extremely conservative.

LYNN MOORER: All right. Let's look at surface water location 10. This is slide 20.

GARTH ANDERSON: Okay.

LYNN MOORER: It shows back in September 2006 a reading of a TCE level of 24 point something, and December, 15 point something. All right. Those are clearly well above what you just stated as a conservative level of 14.

Why isn't access to Johnson Creek controlled? Clearly you're looking at Johnson Creek being a major thoroughfare and a type of a grading mechanism for very high levels of TCE and relatively high levels of RDX. Shouldn't Johnson Creek access at least within the foot of the plume there -- you see, sort of from roughly 6, surface water location 6, down to 10, through that area where we have a history of significantly high levels. Shouldn't access to Johnson Creek be controlled? It's been reported by numerous local folks that children play in that area from time to time, animals drink from that. So why isn't access to Johnson Creek in that area controlled?

GARTH ANDERSON: Well, both the Army and EPA agree that the levels are still within a safe range. However, perhaps some kind of signage might be prudent. But because most of the access to Johnson Creek is on private property, we can't just throw a fence up or deny access to that body anyway.

LYNN MOORER: Nobody is asking you to do that. Clearly, Mr. Anderson, you have the responsibility to let the people know who are the landowners in that area of these high levels and explain to them the relative level as compared to what the most conservative risk concern is. The results are clearly higher than that.

I also would like to hear from EPA on this point. I do note that at the program manager meeting of the parties for this site, December 18, 2006, this record records the fact that EPA believes we should put access controls on the creek until we implement focus extraction.

Is that correct, Mr. Marquess?

SCOTT MARQUESS: We had some discussions about that topic some time ago. And I think -- slow down.

We did discuss that topic. I think the first step is to discuss with the landowner the usage in that area. So the question of whether the preliminary remediation goal or the screening level, whatever you want to call it, the 14 part per billion TCE, could be 14, could be 145. If we restrict the access or abate any potential exposures, then we don't have to really worry about what the levels in the creek are. So I think the first step is probably to understand what kind of activity is going on there, talk with the land owner, seeing whether amenable to any kind of restrictions on that property.

LYNN MOORER: Setting aside whether or not the land owner is amenable to any restrictions, the first basic question is does EPA believe that access should be controlled until we implement -- that is until the court, or whoever implements focused extraction. Do you have that concern?

SCOTT MARQUESS: I think over time -- we observed the levels here. Over time the levels in the creek will anticipate an increase. There's going to believe movement of the plume towards the south.

So the general mass of TCE is going to be heading north to south. So we'd expect to see the levels that discharge the ground level surface water down there to stretch from 6, 8, 10, seeing a little bit of 10. I think in those regions the levels will likely increase over time. So as those levels would increase, we don't abate the groundwater discharge or affect the TCE or the groundwater discharge in that location, that the need for potential – potential need for access controls would increase.

LYNN MOORER: So is that a yes?

SCOTT MARQUESS: That's a maybe.

LYNN MOORER: I do want to register a certain amount of confusion here. It's hard for me to understand how you all, parties to the agreement, that is, EPA, DEQ, and the Corps, at this point can be quite so sanguine about lack of any risk here when you haven't yet agreed upon a cleanup standard for surface water. It seems to be premature for the Corps at a minimum to be concluding there isn't any risk -- or isn't any significant risk that would create a cause for concern.

I have one other question.

SCOTT MARQUESS: If we're at -- if 15 is our benchmark, okay, now let's assume very conservative exposure, very unlikely -- in fact, if we assume weekly exposure --

JIM GARRISON: I'm Jim Garrison, I'm a toxicologist with URS. I actually performed several of the risks assessments done at Mead.

LYNN MOORER: You work for the Corps, is that correct, Mr. Garrison?

JIM GARRISON: No. I work for URS Corporation. We've been hired by the Corps of Engineers.

LYNN MOORER: Right. You're a contractor for the Corps of Engineers?

JIM GARRISON: I'm a contractor for the Corps.

LYNN MOORER: Thank you.

JIM GARRISON: I am a toxicologist. I actually performed risk assessments for OU2 and OU3 back in '94 and 2000. I also reviewed some of the surface water information here.
The surface water numbers that we're talking about, 15, 145, whatever, is based on an assumption of long-term exposure. We're assuming there's

a local resident, that a child goes out and plays in the water anywhere from 17 to 50 days a year, six hours a day; as they get older, adults, they're in that same area for an additional two hours a day. It assumes there's a very long-term exposure.

And risk is really a function of how much exposure you have with time. So if we're out there for 70 years, 15 would be protective. That means if you're out there for half that time, 30 would be protective.

So there's actually a linear relationship between risk and the amount of exposure. So I think that answers the question.

GARTH ANDERSON: And Jim Garrison will be presenting later this evening talking about the whole broad topic of risk at the site. And we'll cover surface water again in a little more detail.

LYNN MOORER: Mr. Anderson, may I ask one final question with respect to surface water before we move on?

GARTH ANDERSON: Yes.

LYNN MOORER: Actually, I think this is probably for Ms. Stoy. Does groundwater discharge to surface water indicate a breach of containment?

MS. STOY: This is Alyse Stoy with EPA.

I don't know that we would necessarily consider that a breach of containment. Certainly we look at all of the different sources of data in the various media to determine what is and is not in containment. We have been working with the Corps under a Containment Evaluation Work Plan. So I think we have a mechanism set up to define what is and is not containment. But ultimately we're certainly, you know, looking closely at how contamination is leaving the site. And if there is an unacceptable risk associated with levels of contaminants in surface

water that is leaving the site, that is something we would be concerned about.

LYNN MOORER: Have the parties reached an agreement on this point?

MS. STOY: Reached an agreement? In terms of how they're going to address releases to surface water?

LYNN MOORER: Whether or not groundwater discharge to surface water indicates a breach of containment.

MS. STOY: We indicated to the Corps in our discussion about what is the definition of containment that they need to achieve certain levels in surface water. So we've come to an agreement -- I mean, this discussion about what the appropriate level or the safe level in surface water, that is what we're dealing with right now. What we're coming to an agreement on is what is the acceptable surface water number.

LYNN MOORER: Let me give you just a couple of points as to what gives rise to the question.

At the last meeting I believe, the January 2007 meeting, is when you handed out I believe on disk, or maybe it was the previous meeting, the Containment Evaluation Work Plan, the final version. So I went through that to see if I could get an answer to this question, and I couldn't find it. It's not discussed in there at least as far as what I could find. I think that's a -- containment, for the local folks -- correct me if I'm wrong, Lorus -- is a big issue, big issue for folks, particularly whether or not it's considered a breach of containment as this contamination moves east, and understanding there's a high likelihood that it will definitely move much farther east when MUD begins pumping.

The second point of clarification for you is -- and perhaps this is before you came onto the project -- January 5th, 2006, the program

manager meeting notes indicate, quote, "Parties need to come to agreement on whether groundwater discharge to surface water indicates breach of containment," closed quote.

It was an issue then. I'm asking you whether or not the parties have come to an agreement on that issue. And so far you've basically told me no. And it also sounds like you just lost sight of that issue altogether. It's not a -- I understand what you're saying about whether or not there's a concern of how high the level is that goes into the creek obviously. But it is a very important issue whether or not movement discharge, using Johnson Creek as a dump for all this TCE and RDX, is a breach of containment, because that obviously rolls into whether or not the ROD has been violated.

MS. STOY: No, there's no agreement on the TCE surface water number. And so to that extent, to say whether or not -- how far contamination has traveled beyond a containment area and whether or not that is or is not containment, that's a number that we would need to -- you know, our opinion, EPA's position is it's the most conservative number. And that is something that we -- before it has been presented at prior RABs. But again, it's very important to us, we know its important to the community to know how contamination might be leaving the site. If there is indication that groundwater is contaminating surface water and that's a pathway for contamination to leave the site, then that will be addressed.

LYNN MOORER: Right. But the rest of the question that still needs to be answered is by dumping all of this contamination into Johnson Creek, is that considered legally -- from a legal perspective a breach of containment? Obviously there's a reason why that issue was raised. That is an important legal question. You've told me you don't have an answer yet, you haven't reached an agreement on that point.

MS. STOY: Well, if you look at the ROD, I mean, it talks in terms of hydraulic containment. And so you know, the Containment Evaluation Work

Plan focuses on hydraulic containment, what the data shows in terms of where the contamination is at a given point in time, and whether or not that contamination is in a larger area than what we knew before. That is a breach of containment, for it to go beyond the point where it is now.

As far as surface water goes, to the extent it's connected to groundwater, yes, it's a way for the contamination to travel beyond the boundary of the site. But you're right, it is a difficult issue when you're focusing on the ROD which speaks to hydraulic containment.

LYNN MOORER: Thank you.

GARTH ANDERSON: Okay. One thing I would like to point out. Earlier we said that the handouts had a corrected surface water 12 slide. We were incorrect when we said that. We have corrected sheets here for those that would like the updated slide for that.

Okay. At this time I'd like to introduce Mr. Matt Wilson who is a groundwater modeling specialist with URS, one of our contractors.

And he is going to discuss some of the changes and the updates that we have made to the site groundwater model. The subject has been of great interest to the community.

MELISSA KONECKY: I'm Melissa Konecky.

Where is that groundwater model?

GARTH ANDERSON: We have submitted the draft groundwater model to EPA and DEQ for review.

So it's under review by the regulators right now. And we just received comment from EPA that we're just getting ready to address and make any appropriate updates if necessary.

MELISSA KONECKY: So it may not be posted for a long time?

GARTH ANDERSON: Not until we issue the draft final. However, were going to be using the model now to do some of our analysis of the plume in parallel to the regulatory review just to get a head start on things. But I think that the changes that we've made we can talk about tonight, some of the improvements we've made to the model.

MELISSA KONECKY: Well, the reason I asked was because it's not in the Mead library.

GARTH ANDERSON: Correct.

MELISSA KONECKY: Okay.

LYNN MOORER: Mr. Anderson, this is Lynn Moorer again.

We appreciate you bringing folks here to discuss this at this meeting. We do want to discuss with you and hear about where you are in the groundwater model. However, consistent with our request at previous meetings, we wanted to have these materials available for people to be able to review prior to this meeting so that we can ask questions from an informed posture. This is the type of thing that should have been posted on your website. This is not posted on your website. Because I have gone to DEQ to obtain a copy, I had the opportunity to review it. But I'm probably one of just a handful of people here at most who's able to come to this meeting from a slightly informed, a slightly -- a little bit ready to ask questions. This is the sort of thing that we asked you at the last meeting, to make sure you post on your website and you get it into the library at least seven days prior to the RAB meeting. We recognize that it's a draft. That doesn't change the fact that for RAB meetings to be meaningful for the public, we need to have the opportunity if we want to review the materials that are going to be discussed at that RAB meeting.

So can you explain why you didn't post this on your website and you didn't provide it to the Mead library seven days prior to the meeting, in fact, you didn't provide it at all?

GARTH ANDERSON: Because it is a draft document. I understand your point. For the benefit of tonight, we'll run through the changes, and we'll be prepared to discuss it again, you know, after the community's had a chance to look at the groundwater model. What we wanted to do is just give folks an idea, because we have discussed updates to the 2004 model at special RAB meetings in the past, and it's always been an issue that the community's very interested in. So this is an update to previous discussions. But we'll continue to provide updates on this as requested.

LYNN MOORER: May I ask once again,

Mr. Anderson, whatever materials are going to be discussed at a RAB meeting or some other public meeting, please make sure that you have provided them to the interested parties, that is, the people who are on your mailing list, get them posted on the website and into the Mead library at least seven days prior to the meeting. I mean, we appreciate having experts here ready to talk about it. But the vast majority of people don't have any ability to ask questions about the report itself because they haven't been able to see it. And that seems like a large exercise in futility. We did explain to you at previous meetings this is what we would like to have, and you said you would work on doing that. We're disappointed that you didn't do it yet again.

GARTH ANDERSON: Matt, would you like to take it away?

MATT WILSON: I'm Matt Wilson. I'm a hydrogeologist for URS.

As Garth said, the model is currently under review. And we based the revisions on comments on the previous model version, RDGM IV, and we installed a lot of wells and collected a lot of new information since

2004 and we incorporated that, and every time we view the conceptual model and see how we can do it better.

The biggest thing you'll notice is that we've expanded the model. And RDGM IV, Remedial Design Groundwater Model IV, only part of the Lincoln water system well field was in the model. And now we've expanded from this yellow line, which is RDGM IV, the Remedial Design Groundwater Model IV, and we've expanded it to this magenta line to include the entirety of the Lincoln water system well field. And the other thing we did, we moved it to the east to get to this boundary, which is the loess mantle till uplands east of the river.

You probably won't care about this, but to make things easier for our maps, we converted the coordinates, the previous models in an earlier version, the datum system. And we collected a lot of information. So not only did we develop bedrock surfaces and other stratigraphic surfaces to the south in the new parts of the model, but we also looked at the interior of the model and revised those based on new information.

Like I said before, we have the Lincoln water system well field, the entirety of it is in it, and the Metropolitan Utility District was in the old model, still in the new model. We went back to the Department of Natural Resources and their registration database and we updated the irrigation wells in the model. And we also simulated evapo-transpiration in Platte Valley. That turned out to be a significant factor. We have plants that have roots inside of the groundwater zone, and they can actually cause significant fluctuations in groundwater levels. So the model simulates that.

We revised the hydraulic conductivity values. We were able to do this because last year we installed observation wells around three of the extraction wells, and we're able to use that data to develop new estimates of hydraulic conductivity.

And the most significant departure other than the expansion is we have a more detailed hydraulic conductivity distribution. Before we had one value for the Todd Valley, one value for the Platte Valley. And now we have a variable hydraulic conductivity distribution which matches rail to simulate the water levels a lot better because of that.

One of the other big issues with the previous model is how well does it demonstrate the interaction between surface water and groundwater.

We worked really hard on that this time to make sure that we were able to simulate flows in surface water and the interaction between surface water and groundwater because that's always a big issue. We were able to benefit from new groundwater level surfaces. One of the things that made this possible was we were able to coordinate our water level measurements with the Lower Platte North Natural Resource District's semi-annual water levels, so now we have water levels in the entire model area that were measured at the same day and that makes for a very good, detailed groundwater surface.

The way we test our model to see how well it simulates reality, it's called calibration where you compare your simulated water levels with your measurements. That's what calibration is very simply. And this model is very well calibrated. The previous model was pretty well calibrated. The number isn't really important, but just the relative number, industry standard is you should get -- your water levels on an average should be about within ten percent of -- the simulated averages should be within ten percent of the observed values. And the previous model was about two percent. We've got that down to 0.6. And that's just an indication that it simulates the observed levels pretty well.

We also did other calibrations to test the model to see how well it reflects reality. And what we did was we took all of the pumping that we've done since 2002 and we treated that like it was a great big pumping test. And we have water levels during that time, we have pumping rates during that time, and so when you stress the model, you

can kind of see how it performs. It's like taking a car out for a test drive. It helps you learn how it works and it helps you understand the system and the interactions as well. So we did that.

We also did a short-term transient calibration. When we installed the observation wells, what we did, we shut down all the wells and then measured the water level changes as we turned them back on. That's kind of like doing a pumping test. And we were able to get hydraulic conductivity estimates from the new observation wells.

The other big difference we've been able to benefit from, the extensive work we've done to characterize the TCE plume. There's a lot of data collected in the fall of 2005 and spring of 2006 and a lot of monitoring well data collected. So the plumes are very detailed. The eastern TCE plume is very detailed now. One of the things we saw, it has a very narrow band of high concentration in there inside the broader plume. And so when we tried to see how the model simulates that, we were able to focus in on a very narrow area and make sure that it re-creates that. History matching is just when you try to assume a source and then you -- assume a source from 40, 50 years ago, and then you see how it grows as you simulate it forward, and you try to get it so that it matches what's observed today. And we did that. And it was a very good history matching, the simulation did very well at that.

We did sensitivity analyses, one of the comments was they wanted documented sensitivity analysis. So we did that.

We did Hydraulic conductivity, which is just -- sensitivity analysis is you change the values and you see how it changes the results, is the model sensitive to this assumption or these pieces of data.
Okay. And the other things we looked at was evapo-transpiration recharge rate, vertical anisotropy. That's a function of the layering. It's the horizontal and vertical conductivity it’s a big factor. We looked at river conductance. And that's just the ability of the river

to recharge the aquifer or for the groundwater to discharge the river or the creeks.

Drain conductance, that's just basically how well the drains drain the groundwater. And the conductance of Silver Creek, Clear Creek, and Johnson Creek, those are gaining streams, how fast groundwater flows into the creeks. And general head boundary is just the edges of the model. Water flows in from the side, from the north, from Yutan, and you have to adjust that parameter.

How will we use the model? The first thing we're going to do -- and we've already kind of started on it even though we're still in the draft stage of the model. Just to get a jump on it, we started on the containment evaluation. The other thing we're going to use it as is a management tool.

If you need to make changes to the model, people ask, well, what effect will that have on the system. So you can use this as a tool to predict what will happen. We'll do transport predictions which is basically projecting into the future, what will happen ten or twenty years from now. And we're going to use a process called optimization. Optimization is just a -- it's an automatic algorithm for doing things like determining what the most effective pumping distribution is, you know, what is the effect modifications will have. And also optimization can be used if you install focus extraction wells, what effect will it have on the system. And it will tell you where to put them, where would be the best place to put them given certain priorities.

GARTH ANDERSON: At this time we need to change the tape. So Matt finished at the perfect time. And when we change the tape, we'll go ahead and answer questions about groundwater modeling. So take five while we change the tape. We'll be back in five minutes.

(8:05 a.m. - Recess taken)

(At 8:14 p.m., with all parties present as before, the following proceedings were had, to wit:)

MATT WILSON: Any questions?

LORUS LUTKENHAUS: On your hundred four million gallon a day under steady state, the one-foot drawdown area goes clear in the plume. Do you agree with that?

MATT WILSON: Yeah, we've got that drawing that's posted down here --

LORUS LUTKENHAUS: Right. I've got a miniature right here.

Do you agree with that?

MATT WILSON: Uh-huh.

LORUS LUTKENHAUS: Okay. So when MUD has the authority to pump 104 million gallons a day, they are going to draw the plume into their water system and they're going to ruin --

MATT WILSON: That hundred and four -- that simulation we did in January, that's a steady state. It will be pumping 104 MGD every day of the entire year forever. That's what that simulation would show. If they just pumped 104 MGD in one day, that would not produce the same drawdown map.

LORUS LUTKENHAUS; And why do I not have that drawdown map?

MATT WILSON: We haven't done a simulation testing that case yet. We haven't been tasked to do that.

LORUS LUTKENHAUS: Has Chapman & associates done that?

GARTH ANDERSON: I'm not sure off the top of my head about what Chapman has done at this point. But what we provided, the hundred and four steady state, was an illustration of the absolute worst case. It's not even a permitted condition under the MUD permit to go at a hundred and four steady state.

LORUS LUTKENHAUS: I beg your pardon, sir. It is for 70 days (inaudible). They can pump a hundred million gallons a day as long as they don't exceed the total amount.

GARTH ANDERSON: As long as they don't exceed an average of 52 million gallons per day average annual rate.

LORUS LUTKENHAUS: A hundred nineteen thousand, million, or something, gallons. As long as they don't exceed that, they can start at day one pumping a hundred and four million gallons a day and continue that amount until they reach that.

GARTH ANDERSON: I guess I'm not going to --

LORUS LUTKENHAUS: -- and then shut down because they've used up their allotted water.

GARTH ANDERSON: And that would not be steady state. That would not --

LORUS LUTKENHAUS: It's a steady state as long as they're pumping.

GARTH ANDERSON: No, I would not agree with that assertion. But I'll --

LORUS LUTKENHAUS: Well, anyway --

GARTH ANDERSON: Anyway, continue.

LORUS LUTKENHAUS: That's fine. I've got another -- I would like you

to get all the drawdown maps that Chapman & Associates has done from day one to present for all these different scenarios that we have down. Now, they've done the work. All they've got to do is copy them. The Omaha Corps should have a copy of them. All they got to do is make a copy and send them to me. I would appreciate if you would do that for me, please.

GARTH ANDERSON: We'll do that for you. We have a copy of the groundwater modeling report that Chapman has done, and we can send those out.

LORUS LUTKENHAUS: And then Mr. Wilson, on your 52 million gallons a day, that's steady state, you're showing -- with particle tracking, you're showing the flow of water going crosscurrent to EW1; is that correct?

MATT WILSON: What map are you talking about?

LORUS LUTKENHAUS: 52 million gallons a day, steady state, particle tracking. I've got a map here that shows water running from northwest to southeast. You're showing the water going from northeast to southwest, going over to Extraction Well 1.

MATT WILSON: Right.

LORUS LUTKENHAUS: That's crosscurrent.

MATT WILSON: There's a difference between -- you know, drawdown does not mean capture. And we're creating drawdown here also. This is just the drawdown that's created by MUD, and we're also creating drawdown over here. And drawdown does not exactly equal capture. It's an indication that you might be getting that, but it doesn't necessarily mean that. I mean, the particle tracking that's created here is created by the drawdown that we're creating.

LORUS LUTKENHAUS: That's what I'm saying. That's not correct. It can't be. You've got -- on Extraction Well 1 you're saying from 6,000 feet east it's drawing all that water to Extraction Well 1.

MATT WILSON: You're not seeing drawdown that we're creating. The entire surface is going down. This is the difference between the static surface, no MUD pumping, and with the drawdown created by MUD.

LORUS LUTKENHAUS: Well, let's just talk about EW1. The way you show your particle tracking. It's 6,000 feet to the east; it's drawing it all to Extraction Well 1.

MATT WILSON: Uh-huh.

LORUS LUTKENHAUS: That can't be.

GARTH ANDERSON: You're talking right there (indicating)?

LORUS LUTKENHAUS: Yes, sir. That measures out to 6,000 feet. In the meantime, Extraction Well 2 is only drawing from 500 feet. So your model is deficient. Has to be.

MATT WILSON: Those are the results.

MS. THOLL: Hey, Matt, show them one mile. That's not 6,000 feet.

MATT WILSON: Well, that's about 5,000 feet I guess. So that's probably -- I'm not sure what that is. That's probably about --

LORUS LUTKENHAUS: It measures out to 6,000 feet.

MATT WILSON: From where to where?

LORUS LUTKENHAUS: From the outside of the particle tracking to the other side of your particle tracking.

MATT WILSON: Am I pointing to the right place?

LORUS LUTKENHAUS: Yes.

MATT WILSON: From here to here (indicating)? Well, this is one mile, right?

LORUS LUTKENHAUS: Yeah. Well, it measured out to about 6,000 feet.

MATT WILSON: Because this should be 5,280 feet, right?

LORUS LUTKENHAUS: Right.

MATT WILSON: Okay. I think the particle tracking is right.

LORUS LUTKENHAUS: Can't be. See, originally I said when you start pumping 104 million gallons, without even seeing the map, I said you're going to go clear into the plume, which it shows it here. You do. And you're also going to find out that it's going to go farther than the plume if you go 104 million gallons a day because you're not going to get the recharge from the Platte River that you're counting on. So that's why I'm saying that particle tracking is wrong. That water on the eastern edge there is not going to go toward Extraction Well 1, it's going to go toward the plume, I'm sorry the MUD wells.

MATT WILSON: Well, there are natural gradients too. The potentiometric surface is sloping like this (indicating). What this measures is a drawdown just caused by MUD. We're also creating drawdown here (indicating). Maybe what we need is a map that shows the drawdown we're creating. But the particle tracking, these are going to follow -- these particles, there's no way that I can make them go anywhere except, you know, perpendicular to the potentiometric lines.

LORUS LUTKENHAUS: That's what I'm saying -- that's where you're deficient.

MATT WILSON: This drawdown drawing is different from the potentiometric surface. This is a difference -- this is a subtraction -- these are going to behave according to the potentiometic surface. Maybe one way we could show this is by showing the potentiometric surface, basically a groundwater level surface, with no MUD pumping and a groundwater level surface with MUD pumping, and then you can see how these are going perpendicular to those lines. Drawdown is different from the potentiometric surface.

LYNN MOORER: I have quite a few questions. I'll ask two. And then I want anybody else to go ahead and ask questions that they have.

Lynn Moorer again. Mr. Wilson, how does the size of the area this model examined compare to the area of the MUD model published in 2005?

MATT WILSON: The MUD model is a much larger area. It incorporates all of Todd Valley. It's -- I think their boundary is pretty close to this, their eastern boundary. I think their southern boundary is kind of close to this. But they go much farther up here. They go all up to North Bend I believe, somewhere around North Bend.

LYNN MOORER: Can you give me a rough percentage? Like the area that your model has covered most recently, this model covers what, two-thirds of the area of MUD's model? Can you give us a rough percentage?

MATT WILSON: I would just be guessing. I don't know. Probably about a third.

LYNN MOORER: About a third roughly?

MATT WILSON: Yeah. We're 200 square miles -- yeah, I mean, I can look up what the area of the load line is.

LYNN MOORER: I'm interested in knowing the relative area size-wise compared to MUD's model.

Now, the irrigation well data from my reading of this model indicates that you relied only upon DNR registration database information; is that correct?

MATT WILSON: That's correct. We also had some information from the university also.

LYNN MOORER: Did you do any independent investigation as to how many irrigation wells there are in your model area?

MATT WILSON: Independent of the registration records, no.

LYNN MOORER: So how many irrigation wells are included in this model?

MATT WILSON: There's about, off the top of my head, about 340 that we got that were registered as active. There are a lot of inactive wells; there are a lot of wells in suspense; there are a lot of wells that were installed and not active.

LYNN MOORER: I note on Table 2-11 of the report I counted 328 irrigation wells that were listed. On page 2-17 of the report you stated 278 active wells out of 339.

MATT WILSON: Right. What happens there, quite often you'll see a well that was installed in the 1950s or sixties, and it will be probably on the high side of the quarter section. Then there will -- it will still be registered as active. And then you'll have a well that was installed right in the center of the quarter section with -- you know, the old well will have a registered acreage of 160 acres, for instance. Then you'll have a well that's right inside the middle of the quarter section that has a registered acreage of about 130.

And we estimate our pumping rates based on the registered acreage. And so you would basically be estimating it on more than 160 acres a quarter section. And what that tells me is that you have an old well that was registered, it was replaced with a center pivot, but they kept the old well active, it was not deregistered, it was not reregistered as inactive or anything like that. And if we pump both of those, you would not be able to match the observed water levels that we see out there. If you pump both of them, basically it would be like you were irrigating the same quarter section twice. If you did that with every single irrigation well that is registered as active in the model, you would not be able to simulate the observed water levels.

LYNN MOORER: I think that a major weakness of your model, as was a major weakness with MUD's model, is that your reliance upon the DNR registration data for irrigation wells allows you to draw some conclusions that are not really accurate.

This has been an issue that's been raised previously that -- and Harold, I'm going to pass the microphone to you so you can make comments on this if you want to. I mean it's generally well-known by folks in this area that there's many more irrigation wells in existence than are actually in the DNR database. And so we have suggested and requested at previous RAB meetings, like the last time there was an in-depth discussion on this, that you need to go out and do some actual investigation yourself to come up with better numbers with respect to the actual number of irrigation wells.

I'd just note for the record with respect to MUD's 2005 groundwater model, which you have told us is a considerably larger area than this model area, Saunders County's consultant noted that the irrigation in the steady area may well exceed far more than a thousand, yet MUD in its model, again like you have done, relied solely on DNR data. And I think that's a major weakness, particularly when you're talking about the summer pumping. Do you have anything you want to add on that, Harold?

I'll pass it to someone else.

MATT WILSON: Thank you.

LYNN MOORER: I have other questions, but I'll let someone else ask a question.

(No response).

LYNN MOORER: I do have a couple more.

Other folks, feel free. If you want to use the mike. Please let me know. I'd be happy to relinquish it. What was the assumed accumulated annual average total pumping rate for the irrigation wells.

MATT WILSON: Of all the wells in the model? I'll have to look up that number, I don’t have that number memorized.

LYNN MOORER: That seems to be to be a very important number. I would like you to follow-up on that I respectfully request that that be included in your final version of that. I think that's important information that we would like to know.

MATT WILSON: It might be in there.

LYNN MOORER: Well, I'd be happy to have you tell us what it is. And if it's in there already, great. But that's what my question is.

GARTH ANDERSON: This is Garth Anderson.

We'll look tonight when Mr. Wilson is done and see if that number is in there and provide it to the audience. And hopefully we'll be able to have that answer tonight. Otherwise, we'll follow-up after the meeting.

MATT WILSON: I might have to do some calculations or something to do that if its not in there. The raw numbers probably I could assemble them and get a number.

LYNN MOORER: I must confess I'm a bit surprised that you don't know the number, because one of the major conclusions on page 7-1 of this report says, quote, "The irrigation wells within or near the plumes appear to have substantially influenced migration of the plumes," closed quote.

So if this is substantial influence, I'm a little surprised you don't know how much that was.

MATT WILSON: We do have pumping range of the ARDC wells. Most of the wells that are inside the plumes are ARDC wells. We have those pumping rates.

LYNN MOORER: I'd like to move on and talk about municipal pumping rates. I notice on Table 2-9 for the City of Lincoln that you just used estimated pumping rates for 2006. Why weren't actual pumping rates used?

MATT WILSON: We made a request of the Lincoln water system. They supplied us pumping rates in August of 2006. Those were the levels we used. We used similar -- they gave us pumping rates I think for -- I forget how many years they gave us, but it was a -- I don't know. I have to look it up. Five or six years I guess pumping rates. So we had pumping rates through August of 2006, and we assumed that they were similar to the previous fall's pumping rates.

LYNN MOORER: All right. So basically the data that you calibrated were from March and October of 2006, correct?

MATT WILSON: That's right.

LYNN MOORER: And what you're saying is this Lincoln water system provided you actual data through August of 2006?

MATT WILSON: That's right.

LYNN MOORER: So at least for March 2006 you could have used actual Lincoln data, right?

MATT WILSON: We did.

LYNN MOORER: All right. Your table says "estimated 2006."

MATT WILSON: Well, it's estimated because we had to estimate September, October, November and December.

LYNN MOORER: You might want to put a note on your chart or something to clarify what was estimated and what was actual.

MATT WILSON: Sure.

LYNN MOORER: Then likewise, with respect to the other municipal water supply wells for Ashland, Ithaca, Mead, Memphis, Yutan, you also indicate -- this is Table 2-10 -- estimated pumping rates. Weren't actual pumping rates available?

MATT WILSON: We did not make that request to those municipalities. In general, those pumping rates were pretty small compared to Lincoln.

LYNN MOORER: Nevertheless, that's important information. Why not use actual data when it is available to you?

MATT WILSON: Well, it's the same thing with irrigation rates. I mean, in some Natural Resource Districts they have very extensive metering programs. And we can get that data. It's a lot of work to collect a

lot of that information, and you have to use the resources that are readily available.

You have to prioritize which ones will have the biggest effect on your model. And the combined pumping rates of the smaller municipalities are actually very small compared to someone like Lincoln or MUD.

LYNN MOORER: I don't think anybody would quibble with you that they're small comparatively. But I do think that that is -- you should at least ask for the actual pumping rates and you shouldn't rely upon estimates unless actual rates are not available.

MATT WILSON: The way we made that estimate was we used per capita consumption estimates. So we did base it on something reasonable. You can't have data for every piece of your model. In some cases you have to make educated guesses. You know, it's a simulation. You know, you can't exactly re-create everything.

LYNN MOORER: Well, it's understood this is a model. It certainly seems to me, if you're striving for something that is going to be the most useful management tool and predictive tool where you're able to plug in actual data, you really should do it.

I want to move on and talk about Table 2-14 which is entitled "MUD Pumping Test Results." There are columns here that relate to transmissivity and conductivity. So there are columns that list the 48 hr constant rate tests for transmissivity and there's another column for 48-hour constant rate test hydraulic conductivity, and a recovery test transmissivity and recovery test hydraulic conductivity.

Throughout this table there are things that I don't understand. And I wonder -- note number one says -- it's got a question mark in parentheses, and it says, "This question mark designates result regarded as questionable by Olsson Associates, HDR, 2005. These results are not included in averages."

Could you explain what that means?

MATT WILSON: Well, it would probably be better if MUD explained that. But I'd have to go back through and look at the data they provided me. When I collect -- I put that table together about a year ago. But I have to look at that closely. I don't know off the top of my head why they questioned those results.

LYNN MOORER: So basically -- but it would be fair to say this is -- these were data provided to you by MUD?

MATT WILSON: That's right.

LYNN MOORER: And Olsson Associates was their contractor, or HDR in this regard?

MATT WILSON: That's right.

LYNN MOORER: I see. So you're just plugging in what what's handed to you?

MATT WILSON: That's right. We didn't test the MUD wells. They tested their own wells.

LYNN MOORER: I see. Okay. Olsson is spelled Olsson for Olsson associates. I was a little thrown off as to what that is. That's the entity out of Lincoln, right?

MATT WILSON: I'm not sure, but it sounds right.

LYNN MOORER: Okay. All right. So Olsson Associates is MUD's contractor?

MATT WILSON: They were one of them.

LYNN MOORER: Right. Okay.

Does anybody else have a question?

DEBBIE KRING: Debbie Kring with EPA.

I just wanted to make sure -- because EPA is reviewing this document in parallel with you finishing the rest of it, I just want to make sure the comments that are being made by Ms. Moorer have been incorporated into what will be going final. If there's a discrepancy whatsoever, I guess my expectation would be that Scott would say something at that time.

SCOTT MARQUESS: What?

DEBBIE KRING: If there are any changes or comments that EPA made on this document, since it's not final yet, I would make some presumption that you would speak up if any of the comments Ms. Moorer is making in regard to the document, if you have looked at them, and if so, what the changes would be.

SCOTT MARQUESS: Yes. I don't believe we made any comments that mimic anything that Ms. Moorer has indicated. We did provide comments yesterday to the Corps, and we had some technical support, secondary review. So I would anticipate there to be some resistance, not necessarily to the model and/or the report.

GARTH ANDERSON: Okay. Do we have one more question before we move on to risk assessment?

LYNN MOORER: I have just two more. The first, Mr. Anderson, with respect to the hundred four million gallon a day drawdown map.

GARTH ANDERSON: Yes.

LYNN MOORER: You e-mailed out to folks who had requested to be on the e-mail list on Friday, April 20th, a couple of drawdown maps, one is for 52 million gallons a day under steady state with particle tracking.

GARTH ANDERSON: Correct.

LYNN MOORER: And the other is simulated drawdowns caused by MUD's pumping at a hundred and four million gallons a day under steady state, but it does not include particle tracking. I would -- but I think I --

GARTH ANDERSON: That's my mistake. I intended to send the one out with particle tracking.

LYNN MOORER: Could you please resend that so that they're matching that?

GARTH ANDERSON: Absolutely. I think I sent a hard copy to Ms. Konecky of those two subject maps, but I'll resend those.

LYNN MOORER: It's a specific request I've had from other folks, they'd like it in electronic form, having the two maps match those two rates, please, with particle tracking.

Okay. I've got one more table or area to ask you about, Mr. Wilson. I'm looking at Table 6-1. It's entitled "Simulated TCE Mass Fluxes in Recent Years." Could you explain what that table shows?

MATT WILSON: Well, basically in the model you can use it to see where the TCE goes, if it goes into a well or if it goes into surface water. And the mass flux, it will give you an estimate of the mass flux into a well or into surface water.

LYNN MOORER: Meaning quantity?

MATT WILSON: Right.

LYNN MOORER: That flows into these areas that are identified?

MATT WILSON: Right.

LYNN MOORER: Okay. So, for example, it tells us -- you've got them broken down into end of year one and end of year five. Can you explain that a little more?

MATT WILSON: I have to look at the table.

LYNN MOORER: Do you want to look at mine or do you need a -- because this looks to me -- it's a very intriguing table, and it appears to provide new information that I think a lot of us kind of would be pretty amazed at these quantities. These appear to be providing for the end of year one and end of year five, whatever that means, "quantities of TCE that are flowing into Johnson Creek."

For example, this says that there's a hundred and five million roughly milligrams per liter per cubic feet per day -- I want you to explain what this is -- of TCE that's going into Johnson Creek?

So is that a cumulative amount?

MATT WILSON: Yeah, I think so. Those units are -- that's what we get out of the model. And you have to do some calculations to get them into simpler units like mass.

LYNN MOORER: Okay. So the column that says TCE mass flux, that is telling us that there are -- how much TCE has gone into Johnson Creek at the end of year one?

MATT WILSON: Well, you've got the table in front of you, right? I mean, it would help me -- I'd be able to answer your question better if

I had it in front of me. I've got a copy of it if you'll allow me to grab it.

LYNN MOORER: Please do. This is Table 6-1 I'm looking at.

MATT WILSON: Right. And your question was?

LYNN MOORER: Okay. If you take the column that -- it says "End of Year One, TCE Mass Flux." So it would be the second column over, the one that says "Micrograms per liter, cubic feet per day." Can you explain what that measure is?

MATT WILSON: Well, that's a concentration and a volume. So that's a concentration times volume. I think what's easier to understand is the grams per day. That's something that's a little easier for me to understand, is grams per day.

LYNN MOORER: Okay. So basically it would be fair to say end of year one that there were 43 grams of TCE per day that went into Johnson Creek?

MATT WILSON: That's right. That's the estimate.

LYNN MOORER: And so for basically an estimated concentration, that means a TCE concentration of 23 micrograms per liter?

MATT WILSON: Right. That's the estimate. That's from the model. I think if you have actual data of the surface water concentrations, that's more reliable. The model isn't going to simulate it to the exact microgram per liter.

LYNN MOORER: I understand.

MATT WILSON: I think what's useful about this would be to measure trends. If you want to get exact quantities, you should rely on the actual surface water data.

LYNN MOORER: So at the end of year five, the TCE concentration is then 65 micrograms per liter?

MATT WILSON: That's right. So you could get an indication that the trend will increase.

LYNN MOORER: All right. So that -- keeping in mind that the groundwater cleanup level is five micrograms per liter TCE, so this chart indicates a strong increasing trend of the amount of TCE that's going into Johnson Creek. And for example, it says on balance, the average -- or the estimate based upon your model is 65 micrograms per liter into Johnson Creek, correct?

MATT WILSON: That's what the table says, yes.

LYNN MOORER: Okay. And so, for example, for you all folks, then this chart also says that at the end of year five, the amount of TCE to the irrigation wells in the Atlas Missile Area plume is up to 108 micrograms per liter, keeping in mind the cleanup level is five, and this is up to 108. I think this is an amazing chart in terms of giving an idea -- these are mass amounts, large amounts of TCE that's going into what they've charted down here, drain tiles into Johnson Creek, into the irrigation wells and AMA. So then I note in one of the conclusions for your groundwater model here is that it says, "The AMA plume," meaning the Atlas Missile Area plume, "appears to have been primarily contained by Johnson Creek in the agricultural drain tiles while Extraction Well 1 may only play a minor role."

So that appears -- is it fair to say Johnson Creek to drain the vast majority of the TCE from the site?

MATT WILSON: That was --

LYNN MOORER: Would that be fair to say? Is that what the conclusion says?

MATT WILSON: Well, yeah, you read our conclusion.

LYNN MOORER: Yes. That again raises the question of why isn't access to Johnson Creek being controlled? These are high levels. This is a large amount of TCE that's going in there.

GARTH ANDERSON: This is Garth Anderson.

Again, we'll be looking at ways to talk to landowners along the Johnson Creek to discuss the levels and look at ways of learning that.

Remember one of the useful -- one of the tools -- or the way that the groundwater model is used as a tool is to be able to have some kind of predictions on what the plume behavior is going to be. So it allows us to implement things well in advance before they become a problem, for instance, making sure that -- because we use the model as part of our containment valuation and then we look out into the future to make sure that what we're doing is going to be effective five, ten years down the road, we can implement things well in advance. And, of course, we keep sampling this surface water along Johnson Creek to make sure that we keep an eye on the levels and see if they're doing what the model says. And if it's true, then it may be something that we have to deal with. So we're certainly not ignoring you.

LYNN MOORER: Mr. Marquess, do you consider -- does EPA consider this model to be adequate?

SCOTT MARQUESS: We had comments -- I don't know if you've seen our comments. But there's a number of –

LYNN MOORER: Simple question. Is this model adequate?

SCOTT MARQUESS: We've asked for revisions to the model in the comments. And I wanted to touch on the notion of groundwater to surface water discharge. That would be one of the issues we would consider as we evaluate the focused extraction, you know, how do you manage the risk that may be present in surface water. One, you can control exposures, or two, you can abate the discharge to some degree. So focused extraction could be a component of how we might address groundwater to surface water discharge, which is not something that's been implemented yet.

GARTH ANDERSON: Okay. At this time we're going to move on to -- hang on just a second.

Do we need to do a tape change before we go on to risk?

Okay. At this time I'd like to introduce Mr. Jim Garrison with URS, one of our contractors. Of course, he gave a quick intro earlier. But again, I want to let everybody know that Mr. Garrison has been on this project for a long, long time and was the principal author of the risk assessments for both Operable Unit 2 and Operable Unit 3. So what we wanted to talk about tonight was to provide a summary to the community of all the risks that have been evaluated at the site, some of the methodology that we've used, and the process we've gone through to get to where we are today. And we'll also talk about some of the risks that have not yet been completely evaluated. Some we talked about before that will appear in the five-year review.

But at this time, Jim, take it away.

JIM GARRISON: Usually when I start talking about risk, the first thing I like to do is, it's kind of a black box to people, what is risk assessment. What we're really talking about, EPA has developed a very specific detailed process for evaluating whether or not a chemical can

pose a risk to somebody. Basically what we do is we look at what chemicals do you have on the site, who could be at the site, and how they could they be exposed to those chemicals. And we look at worst-case scenario, look at very high-end exposure. We want to find out what's the current use of the property, the likely future use of the property, who could be there, how long could they be exposed. When we do this type of process, the goal here is to make sure that any risks that we calculate are going to be protective of everybody, not just a few people. We want to make sure that we're looking at a high-end exposure that should be protective of everybody else in the evaluation. And I'll go into that in just a few minutes.

When we first get started here, we've got a couple pages of acronyms here. I don't really need to go through all of these. What we're performing -- or what we did perform is what's called a baseline risk assessment. That's when we went out and characterized chemicals at the site, of the groundwater, the soils, the surface water, found out what's out there, what chemicals, what concentrations, and we tried to evaluate risks assuming they have not remediated the site and if we leave all those chemicals behind, somebody's exposed to them for 25 years or 30 years or 70 years, whatever we look for, and we try to evaluate the risks. If the risks are unacceptable at that point and EPA says, okay, it's time to go in, we clean up chemicals that are posing these unacceptable risks.

We have, as Garth said, been performing risk work out here for quite awhile. The OU1 risk assessment was focused on soils, performed in 1993 by SEC Donahue. I came on board working with the Corps shortly thereafter and did the human health portion of the OU2 risk assessment which was basically focused on groundwater. Then in 2000 we did the OU3 risk assessment which focused on surface water sediments plus a few other areas for soils and groundwater not evaluated previously.

In addition there was a --

MELISSA KONECKY: We're having a hard time hearing you. Could you slow down just a little? I think the echoing has caused us not to be able to hear you. I'm sorry. Please hold the mic a bit closer.

JIM GARRISON: The OU1 risk assessment performed by SEC Donohue back in 1993, that risk assessment focused on what are the risks associated with chemicals and soils at the site.

The OU2 risk assessment, that's the one I was first involved in, looked at site wide groundwater. We looked at all of the chemicals that were found in groundwater and evaluated the risks associated with potential exposure to groundwater.

The OU3 risk assessment which was conducted in 2000 looked at surface water, sediments, and it also picked up some of the soils in groundwater that had not been evaluated previously in the previous two risk assessments. It was an attempt to be a catch-all for anything that had not been evaluated previously.

When you look at the next to the last bullet here, WES stands for Waterways Experiment Station. That's the Corps of Engineers research lab down in Vicksburg, Mississippi. They did a very detailed risk evaluation -- not a risk evaluation but a plant bio-uptake study. We took soils from the site contaminated with explosives, took it to a greenhouse, did greenhouse uptake studies, took our groundwater contaminated with TCE, watered these plants, and we looked at potential for uptake of explosives and TCE into root vegetables, things like carrots, leafy vegetables, things like lettuce, and then what they call a fruiting vegetable, that would be a tomato, basically looking to see whether or not these chemicals could be taken up in vegetables that people might eat from their own garden.

These are very detailed documents. They're very thick. I've got a box of them down here. But if we have specific questions on numbers, these

things were done years ago. I can dig out the answers and give you a broad overview of all of these.

As I said, we've looked at all of the media out there that had contamination. Soils were evaluated, like I said, in OU1 and OU3. Groundwater was evaluated right here on the site in the OU2 risk assessment. Surface water was evaluated in the OU3 risk assessment, as was sediment. Then we had risks associated with people that might eat vegetables out of a garden as well as people who might be fishing out of the NRD reservoir. We collected fish samples from the NRD reservoir to look for uptake. There's a broad range of chemicals in fish.

When we perform a risk assessment, we don't just look at one or two chemicals. What we do is we take all the data that's been collected at the site and we screen the data to determine which chemicals have the potential to pose a risk. We look at a broad suite of volatile chemicals. That's things like TCE that we find in broad spectrum -- in the groundwater, looking for things like dichloroethylene, acetone, benzene. We're looking for many, many different chemicals. The analytical process looks at a lot of different chemicals these are specified by EPA and told to look for.

LYNN MOORER: Would you please slow down? We're having trouble following you.

JIM GARRISON: Okay.

Again, as I was saying, the way we are required to evaluate the chemicals, we look at broad suites of analytes. We don't just look for what we think was used at a site. EPA gives us a series of criteria to be followed. For instance, with the volatile organic compounds, TCE is one of the volatiles, but there are many, many dozens of volatile chemicals that can potentially be present.

Our analytic evaluation takes the groundwater, takes the soil, looks at the whole suite. Likewise, a semi-volatile compound would include PCBs, also PAH's, the polyaromatic hydrocarbons, could include pesticides those are also looked for. We have our explosives. We have a list of about -- somewhere around 11 to 13 explosive compounds that are analyzed for it, as well as metals, a broad range of metals. We look at all of these chemicals, hundreds and hundreds of chemicals.

We don't find most of them. The risk assessment will focus on the chemicals that are present at significant level and that are detected. If you're looking for hundreds of chemicals and you never see acetone or some other chemical, we don't take -- we don't go any farther with the acetone. We only do the detailed evaluations of chemicals that we've screened in for further evaluation.

One of the things that we look for in risk assessment -- we talk about risk. There's actually two different kinds of risk we need to talk about. One of them is cancer risk. A lot of the chemicals that are present are potential carcinogens, they can cause cancer if you have long-term exposure to it. Things like TCE are considered possible human carcinogens. Many of the chemicals that we find at a site are not carcinogens, but they can still be toxic if you're exposed to some level of them over some limited period of time. We look at both effects.

Things like TCE can have both a carcinogenic effect as well as a non-carcinogenic effect. When you're looking at these, typically the carcinogenic effect is the one we're most concerned about because it can happen with lower concentrations. But we do look at both effects.

In this risk assessment, in the OU1, OU2 and OU3 risks assessments we're trying to find out what population is of most concern. Typically -- and EPA always requires us to do this -- we look at a residential scenario, what happens if somebody builds a house on the most contaminated portion of the site, the soil concentrations of chemicals are highest, the

groundwater concentrations are highest, and they use the water or they're exposed to the soils.

The next few slides are going to be basically focusing on the soils. But with the residential scenario, what we did was we made an assumption, what I consider a high-end assumption.

We want to make sure we're protective of anybody, so we made an assumption that a resident has built a house on the contaminated portion of the house, and lived in that house for 70 years straight, and live in that house 350 days a year. So we're making some high-end assumptions in order so that when we come up with the risk evaluation and the risk numbers, we're pretty sure that's going to be protective of anybody out there, because most people don't live in a house for a fraction of that time period. Typically EPA only requires us to look at residential scenarios for a 30-year exposure. Given this was a farming community, we felt it was more protective to go the extra distance and go for the 70-year exposure.

There are several ways people can be exposed to soils. First bullet says "Incidental Ingestion." People often don’t know what we are talking about this. Basically if you get your hands and touch anything and then eventually touch your mouth, it’s call hand-to-mouth behavior. You will get a small amount of soil that you're ingesting that way. This applies to everybody. It's really bad when they're kids, but it does apply to everybody.

Dermal contact with soils, a lot of chemicals are absorbed through the skin. If you get your hands on soil, on a table, or anything that's been contaminated or exposed to soil, you can pick up a little bit on your skin and you can absorb it. We evaluate that pathway.

Ingestion of home-grown vegetables. Some chemicals can be absorbed into plant material and animal material and can really build up; other ones

don't build up at all. In fact, that was part of the reason for the Waterway Experiment Station

Study, was to find out do these chemicals, are they bio-accumulative. Our models said that it's very unlike that these chemicals will bio-accumulate in the plants. We did go the extra step to give people -- through the Water Experiment Station to do these studies to prove that point. But however, regardless, in the OU1 and OU3 risk assessments we looked at potential for uptake of all the chemicals in the risk assessment that we're evaluating.

We also looked at the potential for wind blown dust for inhalation. So we're looking at people exposed to all these pathways for soils on a daily basis for many years at a time. Because the site is also being used, a portion of it, for industrial purposes, we also evaluated an industrial worker's scenario. This basically assumes it's just adults instead of adults plus children, but we're assuming adults are out there five days a week for 25 years, 50 weeks a year.

GARTH ANDERSON: One thing, you may notice that the handout is a little different than what's on the screen. We had an error in that last bullet. In fact, the residential -- the on-site scenario drove the risk and not the on-site worker for antimony.

JIM GARRISON: The two risks assessments for soils, the two risk assessments, showed that we had several chemicals that posed unacceptable risks. These included a handful of explosives that were evaluated and identified in OU1.

The OU3 risk evaluation that was done later also identified antimony in soil samples around some of the load lines.

Cleanup action was required on this. These are the cleanup goals that we're coming up with. These goals would be protective of the scenarios that we evaluated. You'll notice some differences. Some of these

chemicals have fairly high numbers compared to other ones. These very low numbers are chemicals that are carcinogens, and the ones that are not carcinogenic, you can be protective at higher levels.

Soil Remedial Action. I guess all the explosive contaminant soils were evaluated and cleaned up as a result of the OU1 investigation. The antimony that was identified as a potential risk in the OU3 risk assessment is due to be evaluated and assessed this year.

GARTH ANDERSON: Correct.

Garth Anderson again.

One thing I would like to point out is that in the Operable Unit 1 Remedial Action, we also excavated explosives contaminated soils that acted as a source to groundwater. Although it was technically part of Operable Unit 2, while we were out there doing the excavation, we went and got all the soils, those soils that posed a direct risk and those lower level soils that would continue to act as a source of ground water.

LYNN MOORER: Only down to four feet though, right?

GARTH ANDERSON: Yes.

JIM GARRISON: OU2 is where we evaluated groundwater; a little bit in OU3 as well.

Again, we're looking at cancer and non-cancer effects. We also looked at the residential scenario assuming somebody were to place a well into the groundwater and use that groundwater as a domestic water source. The pathways we looked at included drinking water. That's assuming somebody drinks two liters a day, that's about half gallon of water a day, 350 days a year for 70 years straight. Dermal contact with groundwater, we assume they're also using this for bathing, showering on

a daily basis, that they're using the water to water a garden and they're eating vegetables out of the garden. And while they're showering, things like TCE, which is a volatile chemical, can be released into the air so you get a build up of vapors in the bathroom while you're showering as well. We evaluated all these pathways.

Again, because the site does have -- workers are currently on site, we also evaluated a worker scenario. Again, usually when you do these type of evaluations, it's almost always the case that the residents have a higher risk than workers because they're exposed for longer and to higher levels.

No surprise here, we did find that exposure to groundwater did pose an unacceptable risk if somebody were to use it as a domestic water source. A cleanup action was required. You've been talking about this I'm sure for many of your RABs.

We've established cleanup goals for explosives, I think primarily RDX and then TCE as well. These are the cleanup goals for the chemicals that were identified as posing unacceptable risks.

So you've got a few chemicals in here other than TCE and RDX.

GARTH ANDERSON: Again, we've covered these in just about every RAB. It's been the focus of most of our RABs. But the Remedial Action as outlined in the Record of Decision, we did install extraction wells with treatment of contained groundwater. Actually we started in 1998 with partial installation of the extraction wells, and we did that with the removal action and we completed the network in 2002 and went into full operation. Our focused groundwater extraction is no other component. We have partial implementation of that. And the groundwater is treated prior to discharge. And the final component is any residents that have contaminated water supply wells are provided with alternate water supply.

Actually I think -- do we need to do a tape change now. So this is a good time to stop real quick and do a tape change. Again, if we can be back in our seats in about five minutes, we'll resume.

(**9:10 p.m. - Recess taken**)

(At 9:20 p.m., with all parties present as before, the following proceedings were had, to wit:)

JIM GARRISION: When did the OU3 evaluation for risk, one of the things we looked at was surface water. We also looked at sediment in the creeks. We'll talk about surface water first.

As I've said twice now already, we looked at cancer effects and potential non-cancer effects for people that would be exposed to the chemicals in the surface water in Johnson and Clear Creeks and the NRD reservoir. We don’t - this type of scenario, put a house in the middle of the creek, what we do is try to figure out who is using the creek and how can they be exposed. We came up with a recreational user of the creek as a scenario. We're assuming this is a local resident, they go out there as kids, they play in the creek, they grew up in the area, they keep going back to the creek and the reservoir for years on end. And we did a 70-year exposure scenario. We did an incidental ingestion surface water. We assumed that people are wading in the creek, get a little bit of water in their mouth. We're not assuming people it's like swimming in the creek. It's not really a real deep creek, but they are getting wet, they're getting water in their mouth.

Dermal contact for surface water. Again, dermal uptake, gets in through the skin, is something that can happen with a lot of chemicals. We looked at that pathway as well. And we assumed that people would be fishing out there, would actually be able to catch fish. Now, portions of the creek won’t support a fish population. We did go into the NRD reservoir. We caught a lot of fish. We did evaluations also, potential uptake in the fish. If you can't catch fish in a small stream, what you

can do is still do some modeling where you take known chemical properties and try to figure out what the concentration is if it went into the fish issue.

This was done back in 2000. At that time the concentrations of two primary chemicals of concern that we identified, TCE and RDX, were lower than they are now. But at this time when we did the evaluation, we came to the conclusion that the risks are very low for recreational exposure. And part of the reason is, unlike a residential scenario where somebody is drinking half a gallon a day every day of their life, you've got somebody that's getting a little splashed in their mouth, 17, 20, 30 days a year, I forget the exact number, but assuming somebody out there several days a week during the normal days of the summer. Based on this scenario, the risks were very, very low. We assumed -- or we came to the conclusion no further action was required of surface water at that time.

But as we see on this last bullet, because things are changing in the creek, we are continuing to look at -- as concentrations increase, look at the risks. And we actually have two handouts that we put together looking at risks back in this OU3 risk assessment and then based on concentrations we found at that time as well as what they would be now with the higher concentrations that we've seen.

We also looked at sediment. There really isn't very much in sediments of concern as far as chemical concentrations. The water was the bigger issue we were looking at. The bigger issue was we looked at uptake. But again, we looked at somebody that's getting into the stream, they get sediments on their skin, they have the potential for incidental ingestion and dermal contact. And again, at that point there is no particular unacceptable risks that were identified of exposure to sediments.

I mentioned that we looked at food uptake. I think I probably already mentioned these.

These were evaluated in the OU1 and OU3 risk assessments. We looked at vegetable garden scenario for a farm family as well as somebody that goes out there fishing, catches fish, and eats them on a regular basis out of the NRD Reservoir or the creeks.

Again, we didn't see any potential unacceptable risks for these pathways.

There were some ecological risk assessments performed as well as human health risk assessments. I personally did the human health risk work, and a different person, an ecologist, did the ecological risk assessment. We looked at the same basic pathways that we look at for humans, will ecological receptors, bugs, bunnies, fish, whatever, be exposed to surface water, sediments, soils.

Groundwater is not a particular end point of concern for ecological receptors because fish don't live in wells. Really what we're looking at is where can animals come into contact with these media. And we're looking at a number of different end points.

There's two different primary things you look for in ecological risk assessment. You're looking, one, for things like threatened and endangered species. Species of particular concern. You want to make sure you're protective of everyone of those if possible. And we ended up doing quite a bit of survey work. There are about three or four different species of concern that can potentially be found at the site. We didn't have any indication that they were, but we went out and did some evaluations. There are two different minnows. One's called a Plains Top Minnow. It's rare in this part of the state. It's actually much more common if you go farther east, but because it's on the end of the range, it's considered threatened out here. And there's a different species, I believe it's a type of stickleback, that's also found in some of the creeks in this area. We did extensive surveys in the creeks. Neither of these species were found, nor was the proper habitat for these species found in the creeks. So we're fairly comfortable that we

don't have a problem with these species. There is also a type of orchid, they call it a Western Prairie Fringed Orchid. I don't know that I've known of it or ever saw it. But its found typically in some bog type areas. Again, we did extensive surveys. It was not found on site, nor did they find areas where it would likely be found on site. We just didn't find the habitat for them. Then there's an insect called a Carrion Beetle or a burying beetle. It's a type of beetle that basically feeds on dead animals that is very -- it's an endangered species. It's been found in a few areas of Nebraska, very isolated. We did a lot of trapping studies to determine whether those were present. We found a lot of related species, but this particular animal was never found.

As I said, the ecological risk assessments performed both in OU1, which is just looking at soils, as well as OU3 where they look at soils, surface water and sediments, the risk evaluation basically said that we were not seeing any of the chemicals that were found on site that would pose an ecological risk in any of the ecological receptors.

As Garth mentioned right at the beginning here, I've just gone over the risk evaluations that have been done in the past. There are several things that we're still needing to do at the site. We are just in the process right now of doing an evaluation of what happens if you've got an irrigation well going and TCE is released out there and it reveals a volatilization and somebody is breathing it.

We put a first draft of this evaluation together. It's at the Corps for review right now. We're also meaning to do what's known as a Vapor Intrusion Pathway Plan. When we do the OU1 and OU2 and OU3 risk assessments, nobody really had on the radar screen that chemicals and groundwater that are volatile might actually come up through the soil and get into buildings. This is something that's become a big issue in the last few years with EPA, with the State.

A number of individuals were recognizing that's a possible pathway. We don't know if it's a risk or not, but there is currently an investigation where it's being planned to be evaluated out there to determine whether TCE in groundwater could pose an unacceptable risk if it came up through the soils in the buildings.

And I think Garth put that last one on, military munitions. They've been previously evaluated, but we are still looking --

GARTH ANDERSON: Right.

Again, military munitions, that's the Ordnance and Explosives and weapons material that we talked about at the last public meeting. When you say it's not fully evaluated, we're going to take previous work as well as the Recurring Review and eventually merge it into the CERCLA process that so we have a final determination.

JIM GARRISON: I think that's it.

GARTH ANDERSON: Does anybody have any questions?

LYNN MOORER: Mr. Garrison, would you look at slide number 52? Would you start with that list and tell us which of those chemicals are carcinogenic?

JIM GARRISON: TCE for sure, RDX.

After that, I'd probably have to look up to give you the answers. I evaluate hundreds of chemicals --

LYNN MOORER: I can't hear you.

JIM GARRISON: I know that TCE is a possible human carcinogen. I believe RDX is also. The other ones I've have to look up to be able to answer your question.

LYNN MOORER: Okay. I'd appreciate your following up or --

JIM GARRISON: Usually chemicals that end up on lists like almost always carcinogens. Usually the ones that are non-carcinogens, many of those would be so high that you never really have to worry about them. So I can look that up as soon as we can get off here and find an answer.

LYNN MOORER: All right. And are there other chemicals that you know present at the site that are carcinogenic besides those seven?

JIM GARRISON: I'm sure there probably are. There's --

LYNN MOORER: Benzene.

JIM GARRISON: I don't know if Benzene is present. I haven't --

LYNN MOORER: Toluene.

JIM GARRISON: Toluene is not a carcinogen. The one I know that is present on every site, but it's a background chemical, is arsenic. That's found in soils throughout the country, and that's a carcinogen.

LYNN MOORER: I'm talking basically about the DOD contaminants here.

Just for the record, EPA's 2001 report, Trichloroethylene Health Risk Assessment Synthesis and Characterization does indicate that TCE is highly likely to produce cancer in humans.

LYNN MOORER: I'm just quoting from the report, Mr. Garrison. It says "highly likely."

JIM GARRISON: I agree.

LYNN MOORER: Right. And it says, TCE is associated with cancer of the kidneys, liver, cervix, lymphatic systems, and some say the breasts, breast cancer. TCE is probably one of the most widely prevalent contaminants at Superfund sites around the country, wouldn't you agree?

JIM GARRISON: Yes. And it was also widely used in the dry cleaning industry, so many, many people throughout this country have been exposed to it.

LYNN MOORER: Now, could you explain to what extent -- well, first, I have perhaps an easy fact question for you.

This Plant Uptake Study, when was it completed?

JIM GARRISON: It was done as part of the OU3 risk assessment. And that was -- and it's actually an appendix to the OU3 risk assessment. It would have been completed sometime in the late nineties.

LYNN MOORER: All right. Thank you. Now, to what extent have your risk assessments taken into account cumulative effects?

JIM GARRISON: The risk assessment process we follow requires us to look at cumulative effects. We look at the effects of all chemicals that are present and we add them altogether to come up with an additive risk for all the chemicals that are evaluated, all the chemicals we find that look like they are potentially significant.

In addition -- and a lot of people don't realize this -- the toxicity values that we use in a risk assessment for non-cancer, they throw in a bunch that are known uncertainty factors. But they're essentially safety factors --

LYNN MOORER: Which factors?

JIM GARRISON: They're called uncertainty factors. You can think of them similar to a safety factor. If an animal or human study suggests it might be toxic at some level, they throw in a ten-fold or hundred-fold or even a thousand-fold uncertainty factor to make sure that we're evaluating those chemicals and we are indeed coming up with a protective evaluation. For cancer causing chemicals where you're not looking at a threshold where you're looking at cumulative effect through time, they have what's known as a slope factor, at some dose you have a number of effects and at some other dose you have a different level, and you get a curve on the line. What we calculated in the risk assessment, the risks are based upon what's known as the slope of that line. To be protective, that line, based upon the data, we take the upper 95 percentile of the line, which means we're taking an extra conservative approach in evaluating cancer as well. So both non-carcinogens and carcinogens have added safety built into the toxicity factors as well as the exposure assumptions I've already talked about.

LYNN MOORER: Were current regulatory guidance with respect to health risks including these slope factors, were these used in these risk assessments? What is current today in terms of regulatory guidance, is that what was used for these risks assessments?

JIM GARRISON: We used the values that were current at the time.

LYNN MOORER: The question is --

JIM GARRISON: And those risks assessments were conducted in '93, in '94 and 2000.

LYNN MOORER: So would it be fair to say that the current regulatory guidance for risk assessment, these risks assessments would not meet that guidance?

JIM GARRISON: Most of these chemicals have identical values to what was done at the time this risk assessment was performed. You're probably

referring to TCE, in which case there are some uncertainties associated with what the current TCE toxicity values are.

LYNN MOORER: If current regulatory guidance were used, how would that affect the current plans for your current risk assessments?

JIM GARRISON: When it comes to guidance, those guidance's are basically identical to what was used back then. We're still following the current risk assessment guidance for Superfund.

GARTH ANDERSON: This is Garth Anderson. One of the elements in the five-year review is with the risk assessment to ensure that it's still protective. Any significant changes in guidance, it wouldn't matter or make a difference on the site.

LYNN MOORER: I appreciate both of your responses. But I'm just trying to narrow this down. This meeting is, among other things, to be talking about what we know now, what the state of the risk assessments that you've told us about measure up to what current regulatory guidance requires for risk assessments done at this time? If not, how would that affect them?

JIM GARRISON: I believe they still follow the current guidance.

LYNN MOORER: In all respects, including the slope factor?

JIM GARRISON: The major difference would be TCE. But these risk assessments did say TCE was an unacceptable risk. We would still come to that conclusion today. So the conclusions would not change.

SCOTT MARQUESS: One of the issues that was raised in some previous correspondence had to do with the ecological risk assessment. So I know typically those can take a while to complete. But the guidance was changed in '97. So I know that was one of the comments I think you addressed in a meeting or two ago. But generally we wouldn't -- you

know, on all of our sites, you know, sites that EPA or some other -- PRP completed in 1992, we wouldn't go back and rerun -- completely rerun a risk assessment. We would look at any significant changes, you know, every five years if there is still waste in place to say, well, this changed, that changed, the other thing changed since the '92 decision or since the '97 decision and determine if in any of those changes made an effect on the protectiveness of the remedy. So we wouldn't as a general rule go back and completely redo a risk assessment, but we might, like in this case, look at pathways that maybe weren't on the radar screen like vapor intrusion, if it wasn't there then, that we're now aware of now, or things like changes in -- and one of the most common things is have the toxicity factors changed over time, and does that affect the risk. He mentioned arsenic. I know EPA changed the MCL for arsenic from 50 to 10 in the last year or two. So those would be the common things that we would look at as far as risk and protectiveness.

LYNN MOORER: As a part of this five-year review?

SCOTT MARQUESS: Correct.

LYNN MOORER: So these will be looked at?

SCOTT MARQUESS: Yeah, we'd go back and look at the risk assessment. And, you know, we've already some time ago identified some pathways that hadn't been considered. So we would also as part of the five-year review look at all the chemicals that were present at the site and all the toxicity factors that might be associated with those and has there been any changes, and if there have, does it make a difference to the protectiveness of the remedy if would we do anything different. And as Jim said, like for TCE, the slope factor, you know, is a matter of debate as to whether it's changed.

But even so, you know, we would still be targeting the MCL as the cleanup standard of five parts per billion in groundwater. So a new component of that would probably be the vapor intrusion component.

LYNN MOORER: Speaking of the vapor intrusion component, I note from the documents that there's been a great deal of delay or slippage or foot-dragging, depending on how you want to look at it, with respect to assessing vapor intrusion. The first note that I found was that this work plan draft, this vapor intrusion work plan was supposed to be submitted in February and it wasn't done. Then it got delayed. Then it was going to be submitted in April, April 12th. And now that wasn't done. And recently again the Corps, the Kansas City Corps, has asked to have that slipped now to May. So this has been a continual problem slipping -- the Corps not meeting deadlines. I'm not nearly as sanguine apparently as EPA and NDEQ and the regulators are with respect to the risks on this vapor intrusion.

There's very large amounts of TCE we know, some at very high levels, all throughout the site. When is EPA actually going to say, all right, we've got to have a plan in place for vapor intrusion and not agree to any more delays with respect to submitting a plan?

SCOTT MARQUESS: Well, from a regulatory perspective, I don't have an enforcement mechanism to say thou shall submit a vapor intrusion work plan on a date certain. What was included in the enforceable schedule was an evaluation of the pathway. And so what happened was that it was quickly assessed that there actually is reason to further assess that. So subsequent to that original schedule, there was a schedule that was proposed for the submittal of this vapor intrusion sampling work plan. So that's why it is as it is. And I think the Corps might want to address some of their concerns in terms of internal issues that they've had.

GARTH ANDERSON: Garth Anderson. One thing that we're trying to rectify is we have Army policy at the Department of Army level that we're trying to stay in compliance with, and our management on up the chain has directed certain things to be changed in our internal draft before we

can submit to EPA. But I think we've got those resolved, and we'll be submitting it to EPA next month.

LYNN MOORER: You absolutely will submit it next month?

GARTH ANDERSON: Yes.

LYNN MOORER: All right. Did I understand you correctly, Mr. Garrison, that a report or something with respect to inhalation of vapors due to irrigation has recently been submitted?

JIM GARRISON: It's not been submitted yet. A draft has been provided to the Corps for their review to see -- they're probably going to make some comments that need changes on it. But yes, we have started that evaluation process.

LYNN MOORER: Oh, I see. You, the contractor, have submitted it to the Corps?

JIM GARRISON: Yes.

LYNN MOORER: I see. So when is it reasonable that we would see a plan from you on that?

GARTH ANDERSON: I can't give you an exact date. What I would like to do is put if in context. We've been talking about the five-year review. And what the five-year review does is just identify pathways or other changes that need to be addressed in the future. The five-year review does not resolve them or come up with an ultimate solution to that. But what we're doing is, in the process of preparing a five-year review, we've identified some pathways already such as vapor intrusion. So we're ahead of the game on the five-year review. And irrigation is the same way, we've identified it and we're working internally to make sure we have something in place -- and we're not waiting for the conclusion

of the five-year review that says yes, you need to do this. We've already identified that and are moving forward.

LYNN MOORER: Thank you for your response, Mr. Anderson. I just want to perhaps suggest respectfully that while you all view these as just little points in time on your continuum of reports to put together and you consider yourself ahead of the game, we consider you way, way, way, way behind. This is much too long that this cleanup and proper assessment and evaluation has drug on. And so I don't think that it is fair for you to sort of pat yourself on the back somehow that you're ahead of the game, you are way behind. And it's taking months and months and months if not years for the folks to bring issues -- Lynda Wageman was talking about vapor intrusion roughly three years ago at a RAB meeting.

And you all have just allowed this to be neglected over to the side, and you've not made this a priority at all. And it is just mind-boggling that you could be presenting information on print that says no further action is necessary regarding surface water when you haven't even agreed to a surface water risk standard. Let me just suggest, that sort of papering over of the dearth of your actual rigorous analysis is not acceptable. We can see through this as this is a great concern. You need to be doing this a whole lot faster and a whole lot more competently than you have been doing.

I have another question for you, Mr. Garrison.

To what extent to you look at synergistic effects?

JIM GARRISON: There is no way we can look at synergistic effects or antagonistic effects.

The synergistic effect is when we have two chemicals, we put them together and we have more than an adequate effect. An antagonistic

effect is when you have two chemicals, you put them together, and the sum of their risks are less than the individual ones combined.

LYNN MOORER: Isn't it true there can be two or more in terms of synergistic effects?

JIM GARRISON: I'm not trying to imply that it's two or four or anything. I'm just saying that's the definition of what a synergistic effect is. We don’t have any - The current science does not allow us to evaluates synergistic or antagonistic effects.

That's true in risk assessment, that's true in pharmaceutical research, that's true in pesticide registration. These are areas I'm quite familiar with.

LYNN MOORER: So it might be another fair way to perhaps put a note or make a disclaimer on your risk assessments, by the way, this does not examine synergistic effects at all, there may well be a whole lot of complicating factors. Like, for example, this TCE report of the EPA notes that, "TCE exposure can augment the toxicity of other chemicals and that TCE can affect children and adults differently." There's a lot of variations that are not well understood; is that not fair to say?

JIM GARRISON: Now, when you're talking about different effects in different subpopulations, the toxicity values of these are based upon the most sensitive subpopulations. And we apply that across the board to other portions of the population.

As far as the uncertainties, yes, there are uncertainties associated with risk assessment. We have a full chapter dedicated to the uncertainties associated with risk assessment. That is part of the reason that toxicity values and the exposure assessment we do as part of the risk assessment to identify our scenarios are so conservative to begin with. We can live with being overly conservative in our

evaluations, but we don't want to underestimate risk. So we put a lot of conservatism into these evaluations.

LYNN MOORER: How many people do you calculate will die from the risks associated with this site?

JIM GARRISON: I don't have any way of answering that. These risks are -- I'd have to look at the actual risk assessments to see what the cancer incidence rate is, not death, but incidence. And it's based upon one, two or three per million, it's not based on six people at a site. And it's not based on any individuals that are being evaluated here either. These are risks that are associated with somebody that would be living at the most exposed part of the site where the concentrations of contaminants are at their highest, which is not reality right now, and we're assuming they're there at the current concentrations for 70 years straight.

LYNN MOORER: So you can't tell us?

JIM GARRISON: The risk assessment gives you the numbers associated with each of the scenarios for each of the concentrations. I have 1500 pages of risk assessments. I can go through the numbers with you. But it doesn't really tell you what it means to the community. It's going to overestimate whatever the risks are to the community.

LYNN MOORER: What is the relevance of groundwater to surface water interaction with protection to the human health and the environment?

JIM GARRISON: We look at actual concentrations in these risk assessments being evaluated. We look at what was actually in the groundwater -- or actually in the surface water. The groundwater/surface water pathways are typically evaluating in the model that Matt Wilson for instance was talking about. So I'm giving you risks associated with chemical concentrations. To try to say what groundwater concentrations to give you, what risk and surface water, I

have to rely on the modelers to tell me what it's going to be. I actually have to rely on the groundwater modelers to tell me what that groundwater concentration is going to result and what surface water concentration. I'll take that surface water number, and I can run a risk on that.

LYNN MOORER: But do you recognize their interaction there?

JIM GARRISON: Right. But it's not typically part of the risk assessment process so much as it's part of the overall investigation process to try to characterize what's going on at the site.

LYNN MOORER: Perhaps one of the other people should address this question. It's not necessarily tied -- my question isn't necessarily tied to risk. I'm talking about protectiveness for human health and the environment at the site.

GARTH ANDERSON: Well, I think what he was trying to say is that we have measured values in surface water, and you run a risk assessment based on those measured values. And the fact that it might have come from -- it came from the groundwater surface water interaction, the risk assessment itself doesn't really care how it got there, just the fact that it's there.

LYNN MOORER: You're not answering my question.

GARTH ANDERSON: I guess I don't understand the question then.

LYNN MOORER: My question has more to do with your strategies, that is looking at the interconnection between groundwater and surface water particularly at this site, it could be Johnson Creek, it could be one of the other places. To what extent have you factored in that interconnection in you’re trying to figure out what is the most protective things for human health and the environment? And it doesn't appear that you're doing anything. It doesn't appear you've even

acknowledged that you've got very high concentrations of TCE flowing down Johnson Creek.

GARTH ANDERSON: I disagree with that assertion.

LYNN MOORER: That's what I'm asking. Tell me what you think you've done to take that interconnection into account.

GARTH ANDERSON: Well, regardless of the interconnection, first we monitor the Johnson Creek quarterly so we know what is going into the creek. We built in the surface water to groundwater interaction for the groundwater model so that we can see and predict what we may see in Johnson Creek in the future. And based on our risk assessment for surface water, we can tell if the levels in the creek are at such a level that would trigger some type of protective action.

So I would disagree with your assertion that we've done nothing to address surface water.

LYNN MOORER: You do have a very strong talent, Mr. Anderson, of being able to dodge and dance around the question or else act like you just don't understand what I'm asking. Ordinary people do understand. Maybe that's -- maybe you're in the right place, working for the Army.

GARTH ANDERSON: Thank you.

LYNN MOORER: But I will tell you that it's not acceptable with respect to providing the information that the community needs to know.

SCOTT MARQUESS: Maybe I could try. And we talked a little earlier about this. I think there's two ways to address risk to surface water. One is to ensure there's no exposures, which is where, you know --- the levels in Johnson Creek of TCE in the surface water 8 location begin to border on, you know, where we start to take action. Okay?

LYNN MOORER: Talk about 10.

SCOTT MARQUESS: Well, 10 is less than 8 I think. That varied the last two rounds. But I think 8 is the historical highest, 40 or 50 parts per billion.

So two things can be done. One is to eliminate exposure, restrict exposure; as I indicated previously, two is to consider the focused extraction component of remedy which has not been implemented, which would be a way to stop the discharge, to stop those potential exposures from happening, so you get reduced TCE discharge to the creek.

Those are two things on the table. We do not have a focused extraction component of remedy in place.

HAROLD KOLB: My name is Harold Kolb.

When are you going to get this in place? Scott, when are you going to get this in place. The question I was going to ask is, what are you doing to stop the groundwater contamination from getting into the surface water? That's what should be done, and you're not doing it.

SCOTT MARQUESS: Right. I concur.

What's going to be done? Well, we haven't -- that was what the site management plan is supposed to be about. And it was supposed to -- we originally constructed -- we were going to start on the east side of the site and move to the west and investigate and design and install systems.

HAROLD KOLB: The problem is on the east side. That's where the contamination is getting into the surface water but yet it's not being taken care of.

SCOTT MARQUESS: It's not right now, correct.

HAROLD KOLB: When will it?

SCOTT MARQUESS: I don't have the site management plan schedule memorized in my head. It was originally going to be –

GARTH ANDERSON: What we've done -- this is Garth Anderson again -- with our updated groundwater model that we talked about earlier, we now have a good tool to evaluate the groundwater/ surface water interaction. And using this groundwater model, we can now find the optimal solution to being protective now that we have a better understanding of how the groundwater behaves at the site. And would thing we have found is that when you do implement things like focused extraction at the site, you can't just put something here and put something here, you have to look at the site in its entirety to make sure that what you put in doesn't affect this plume, you know, draw something this way, or something you put here might draw a plume this way, you have to look at it in a comprehensive manner. So we talked about earlier what's the additional plume investigation so that we'd have a very good handle on where the contamination is so that we can implement focused extraction across the site. And one of the things that it will address is that interaction between groundwater and surface water. Because the levels we see right now -- we see levels in the streams right now and we see the model prediction getting higher all the time. And that's why the model is such an important tool and allows us to address that.

SCOTT MARQUESS: Harold, originally the remedy was going to be -- the cleanup part, the focused extraction, was on 8, 9, 10, and 11. As Garth indicated, there's a proposal that changed the approach and grouped all three of the easternmost plumes together into one action starting in 09. So some will be delayed and some will be expedited.

That's on the table right now.

LYNN MOORER: Mr. Anderson, you just stated that the model is a very important tool, correct?

GARTH ANDERSON: Yes.

LYNN MOORER: Will you -- that is, will the Corps incorporate all of the comments that EPA gives you and that DEQ gives you, will you do everything -- another way of asking it is, will you do everything that DEQ and EPA asks you to do with respect to this model?

GARTH ANDERSON: As we've discussed many, many times before, we look at all comments received from DEQ and EPA, we respond to the comments, you know, what we think is an appropriate response, and then all parties come together and use all the comments and come to a mutually agreeable path forward on the document. That applies to the groundwater model, it applies to the design, it applies to the remedial investigation, every document that ever goes regulatory review.

LYNN MOORER: Well, the record, of course, reflects the fact that the vast majority of comments that you receive, regardless of whether it's regarding the model or many of the other facets of the site, you tend to use the comeback statement of saying that's not within the scope of this particular study, we're not going to do it. And so I would say if you were to do an assessment of all the comments that have been given to you by EPA and DEQ over the last three-year period, more than half of them you have basically thumbed your nose at and said, we're not going to do it. And I understand the regulators have a balance that they have to look at there. I'm not -- please don't look at this as I'm letting EPA or DEQ off the hook here, because I think you've been very limp wristed regulators for long time at the site needlessly. So I also recognize that there's a point at which certain documents have to be finalized to get you guys to do anything. But I just want the record to reflect that your comments do not match your actions. You come to these meetings and tell us, oh, this is a very important document, we're going to use it as a tool, or this model is a very important tool, we're going to use

it, but in reality you don't ever do everything the regulators tell you to do that needs to be done to be actually protective for health and environment at the site. You never have.

GARTH ANDERSON: The process allows for professional disagreement. And we know that. And we always come to resolution in the end.

LYNN MOORER: Of course, resolution is not the same thing as actually doing what you should be doing. You've demonstrated that long and wide. And so I want the record to reflect that you're not a good -- most of the time you do not do what needs to be done to be protective of health and welfare at this site. The continued delays for vapor intrusion and your negligence with respect to addressing vapor intrusion for more than three years now is a prime example. There's just no excuse for that. I suspect that there's going to be a lot of pretty concerned people once they have a better idea of the risks that they've actually been exposed to because of vapor intrusion related to this site.

Lynda Wageman brought this to your attention a long time ago, and you've done nothing about it. That's not acceptable. So on her behalf, I want to reiterate that again. You guys should be ashamed of yourself with your foot-dragging with respect to allowing so many risks to prevail for a long time at this site. That's unacceptable.

MELISSA KONECKY: Definitely.

GARTH ANDERSON: Okay. Next question?

DEBBIE KRING: Debbie Kring of EPA. This is not a question. It's just a comment and a note for the record.

Because some things are ongoing -- Ms. Moorer, I'm kind of relating this to you -- things are ongoing on a daily basis. And I will tell you that Scott meets with the Corps at least once a week. He's in contact with them. And because things aren't always as they seem, I will tell you

that this site has a lot of sensitivity and is at upper levels in our management in terms of getting things done. It's not being looked behind and it's not being taken for granted. Scott takes this very seriously. And if we need to be up here more, we'll be up here more. But I will tell you that he puts his heart and soul into this site. There isn't a day that goes by that he isn't dealing with it.

CHRIS FUNK: Chris Funk.

I guess I've been sitting through this for years also. And I also get that Scott in particular has fought to try to protect this. And I've seen, you know, the inter-office memos and the stuff that goes back and forth. And every time it seems like, you know, the Corps is battling to get it done, I don't know if it's the cheapest or the easiest or what. But I really feel like we're the ones that are losing through all of this. I've spent so much time and so many years I'm still hearing the same thing I've heard three years ago, and it's getting very frustrating.

GARTH ANDERSON: Okay. Looks like we're to the end.

Okay. Looks like we're at the last slide here. Future RAB topics, we need to know -- we'd like to know what topics are of interest to the community and what we can present at the July RAB meeting.

We have a question or comment in the back?

LORUS LUTKENHAUS: I have a question.

Lorus Lutkenhaus. At each RAB meeting, I wish you would allow the questions at the end of the meeting. You didn't have it on the agenda.

GARTH ANDERSON: Go ahead.

LORUS LUTKENHAUS: Has the groundwater monitoring wells for MUD, has the number and location been completed yet?

GARTH ANDERSON: I believe MUD wells are being installed as we speak. New monitoring wells are being installed as we speak.

LORUS LUTKENHAUS: How many?

GARTH ANDERSON: I don't know the number off the top of my head, but that's a number I'll get for you.

LORUS LUTKENHAUS: Do you have a the 206 existing wetlands and stream monitoring report currently?

GARTH ANDERSON: That's outside my purview. That's a question you've have to take up with MUD. I don't delve into the wetlands.

LORUS LUTKENHAUS: On your AOP plant how many extra gallons are you figuring running through there above what you're running through the extraction wells right now?

GARTH ANDERSON: I'm sorry. Restate the question. I missed the first part.

MR. LUTKENHAUS: On the AOP, Advanced Oxidation Plant, how many gallons are you figuring running through there besides what you run in normally now?

GARTH ANDERSON: Where is Brady Bigelow? There he is.

MR. BIGELOW: 600.

GARTH ANDERSON: 600? 600 gallons per minute is what EW11 will pump. Keep in mind, when we turn on EW11, EW8 will shut down.

LORUS LUTKENHAUS: Thank you.

MR. ANDERSON: You're welcome.

GARTH ANDERSON: Okay. RAB topics for the next meeting, you can either contact me directly, or if you would contact Melissa Konecky and she can relay those to me.

Obviously we have our standard topics of the quarterly groundwater monitoring program.

And another thing I'd like to do at this point is go over some action items that were brought up, some due outs back to you. Bear with me a second and I'll read down my list. And if anybody has ones I missed, please let me know.

Okay. We had a question about the volume and the mass of contamination that goes into the surface water. I think we want to do a calculation on that.

SCOTT MARQUESS: That's in the groundwater modeling report I'm pretty sure.

GARTH ANDERSON: Did we find an answer to that? I mean, when didn't come up with an exact answer. We came up with a flux. Did we come up with a mass on that?

SCOTT MARQUESS: Two to 400 grams per year --

LYNN MOORER: The groundwater model portion that I looked at deals only with TCE. Okay? And that’s not the only thing.

And it's deals with certain locations on the site. But we're talking all creeks, Clear Creek, Silver Creek, Johnson Creek, all contaminants.

GARTH ANDERSON: Okay. We'll make sure that we'll get an answer back on that.

Lorus asked for all the Chapman & Associates maps for MUD to be printed out and sent. And we'll get that to you.

LYNN MOORER: Mr. Anderson -- Lorus correct me if I'm wrong -- he and I talked about asking for this, but I don't think we actually said it out loud. On those maps, we'd like to have drawdown maps at five-million-gallon-a-day increments. So do it at 60 MGD, 65, 70, 75, 80, 85 so that we've got the incremental buildup on drawdown. So this would be a matter of perhaps you running your model to come up with maps for all of those increments in between comparable to what you've done for 52 and 104. Am I making myself clear?

GARTH ANDERSON: Matt Wilson and I were talking during the break. And we're trying to come up with a clearer way to depict the actual effect of the MUD pumping on the plume. And the particle tracking is one way. The drawdown tends to be -- doesn't tell the whole story. So we'd like to attempt to try to draw something a little more clearly about effects with MUD and without MUD that shows, you know, what the actual change might be. I think it would tell a much clearer story. And I think -- Matt, we're -- I think we have an idea on that.

SCOTT MARQUESS: Potentiometric maps.

GARTH ANDERSON: Exactly.

LYNN MOORER: Well, we'll accept whatever you want to provide us in addition, but for sure we would like you to generate maps at each five-million-gallon-a-day increment between 52 and 104, you see, equivalent to what you've done here so far.

GARTH ANDERSON: Okay.

MS. MOORER: Okay? So you can add or give us more if you think it is more illustrative or a better depiction, but for sure include those five-million-gallon-a-day increments.

GARTH ANDERSON: OK yes I do think there is a better way to look at that. Okay.

Next question was we need a more specific answer on relative areas of our model versus the MUD model. I need to re-e-mail the MUD map with the particle tracking. I inadvertently sent the one with out the particle tracking.

LYNN MOORER: Actually, Mr. Anderson, at least five-million-gallon-a-day incremental maps that I just asked for, if you would send those in e-mail form too to the same group, that would be helpful.

GARTH ANDERSON: Okay.

SCOTT MARQUESS: One of the last data figures on the MUD model had a bunch of that. They had a 90, they had a 104 --

MS. MOORER: They didn't go every five.

MR. MARQUESS: They didn't go every five, but you're going to bound the delta I think by seeing what -- but it just may be worth a look.

GARTH ANDERSON: This was a note to myself because we did have some corrections to the briefing slides. I'm going to post a corrected set on the website so that we have a final version available to everyone.

The next two are kind of -- they're synonymous or -- our picking dates for the next two events, the first date is the site visit, sometime in June. And Melissa, I need to say that I'm not available until the 20th because I'll be doing some -- I'll be out of town for a good part of

June. So the 20th and later would be fine if you can find a date that would work.

MELISSA KONECKY: Okay.

GARTH ANDERSON: And then we also need to select a date for the July RAB meeting. And if it's -- if this facility seems okay, we can continue to use this one.

MS. KONECKY: I'll get back with you on that, because we're checking other places too.

GARTH ANDERSON: Okay. Just let me know. I guess I can go ahead and talk to Mr. Farewell and go ahead, and when we get a date, just book it tentatively if necessary.

LYNN MOORER: Why don't you wait until Ms. Konecky gets in contact with you?

GARTH ANDERSON: That's fine. I'll be waiting.

Next item, we just needed to have a definitive answer on which of the groundwater contaminants of concern were actually carcinogenic. I don't think we came to a final answer to that.

LYNN MOORER: Actually, it's more than just the contaminants of concern. Any of the contaminants at the site that have been discovered that DOD is willing to accept might be their responsibility. Thank you.

GARTH ANDERSON: You understand that question, Jim?

JIM GARRISON: I believe so. (inaudible)

GARTH ANDERSON: And the next item is the number of MUD wells going in, what their hydraulic network is going to look like.

Did I miss any items along the way?

LYNN MOORER: Review the transcript and the tape and pick up anything else that you've missed.

GARTH ANDERSON: For purposes of this meeting, I know the transcriptionist will go and review the video of the first ten minutes to recapture that. And we do as a matter of practice review the transcript contemporaneously with the video to make sure that we capture everything that's said.

Any other items that I might have missed?

Okay. Well, I think that's a wrap.

If anybody has any specific questions that they need to talk to us one-on-one, we'll be here for a few more minutes. Thanks for coming. And we'll see you in June for the site tour and in July for the RAB.

Thank you.

(10:15 p.m. - conclusion of proceedings.)

CERTIFICATE OF REPORTER

STATE OF NEBRASKA)
) ss.
COUNTY OF DOUGLAS)

I, SUSAN M. McKENZIE, General Notary Public within and for the State of Nebraska, do hereby certify that the foregoing proceedings were taken by me in shorthand and thereafter reduced to typewriting by use of Computer-Aided Transcription; that the foregoing one hundred twenty-one (121) pages contain a full, true and correct transcription of all of the testimony of said witness to the best of my ability;That I am not a kin or in any way associated with any of the parties to said cause of action, or their counsel, and that I am not interested in the event thereof.

IN WITNESS WHEREOF, I hereunto affix my signature and seal this 29th day of May, 2007.

_____

SUSAN McKENZIE
General Notary Public
MY COMMISSION EXPIRES:

FORMER NEBRASKA ORDNANCE PLANT
RESTORATION ADVISORY BOARD MEETING
HELD IN ASHLAND, NEBRASKA

DATE: APRIL 24, 2007
TIME: 7:00 P.M.

COST CERTIFICATE

I, SUSAN M. MCKENZIE, General Notary Public within and for the State of Nebraska, do hereby certify that the following costs should be assessed in the above-entitled matter to:

FORMER NEBRASKA ORDNANCE PLANT RAB MEETING
DATE TAKEN: APRIL 24, 2007
AMOUNT: $ _____
DELIVERED TO: ECC-COLORADO
ATTORNEY FOR: BRADY BIGELOW
DATE DELIVERED: _____ day of _____, 2007.

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SUSAN M. MCKENZIE,
General Notary Public
My Commission Expires: 2025